



VOLUME 8 NUMBER 11
JUNE 13, 1989

**Free Utility:
Bring COLOR to
Your OS/2 Screen**

Three Great Reasons For OS/2

**Paradox
Q&A
R:BASE**

**PC Labs Tests the
Top-Performing
Databases:
How Much Better
Are They?**

**The Complete Guide
To Laser Fonts:**

- 11 Font Cartridges
- 21 Soft Font Packages
- 4 Font Editors
- 10 Font Utilities
- 9 Font Generators

**Do-It-Yourself
Forms Creation:
17 Programs Save
Money and Time**



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affordability—the works."*



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WHAT'S INSIDE

A wit once said that there's only one thing worse than being talked about, and that's not being talked about. That's good news for OS/2, the future of which has been under fire for 2 years. If the success of OS/2 weren't still a subject of debate, this logic goes, there would be reason to conclude that its future had already passed.

But many indications, like the recent release of the OS/2 Presentation Manager, suggest that OS/2's future is only just beginning. One of the clearest signs is the appearance of real OS/2 applications that take advantage of the operating system's multitasking capabilities, unlike OS/2-compatible pretenders that merely run in OS/2's single-tasking compatibility box. In our first cover story devoted to this new generation of applications, contributing editor Richard Hale Shaw discusses what it really means for an application to run under OS/2, and he examines three of the earliest entries in one of the most strategically important product categories there is: databases.

The DOS counterparts of the three programs Shaw reviews—*Paradox OS/2*, *Q&A OS/2*, and *R:BASE for OS/2*—are among the most powerful databases on the market. As OS/2 applications, they offer the same features and functions that made them strong DOS performers and then some, often executing typical database tasks at speeds unheard of under DOS.

Yet as Shaw notes, the productivity gains that application developers can realize with these products are not attributable



"We want end users to be more aware of what OS/2 can do for them," says senior technical editor Tony Rizzo.

solely to their speed: it's their ability to perform multiple operations simultaneously that really makes the difference. But while developers may be the most obvious beneficiaries of the removal of the single-tasking bottleneck, end users stand to profit too. Beginning with the publication of *PC Magazine's* first OS/2 utility, *COLOR.EXE*, in the Productivity section of this issue, we start to look at OS/2 as an end-user application that lets you better manage your computer's resources. In preparation for the introduction of more OS/2 applications in the coming months, "we developed a script, of which Jeff Prossire's *COLOR.EXE* utility is a part, that will help end users play with OS/2 and show them that it's not beyond their needs," says senior technical editor Tony Rizzo, who recently joined the magazine to manage the Productivity section. Expect to see more OS/2 utilities—and more reviews of OS/2 applications—over the course of the year. —Robbin Juris

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COVER STORY

Databases for OS/2:

The First Wave

Richard Hale Shows OS/2

is celebrating its second birthday, but so far it's had a lonely childhood. Hundreds of

applications have been

promised; few have been delivered. *PC Magazine* looks at three powerful OS/2 databases that have made it to market: *Paradox OS/2*, *Q&A*

OS/2, and *R-BASE for OS/2*.

Each promises to increase your productivity; each promises significant improvements over its DOS counterpart. But is that reason enough to make the

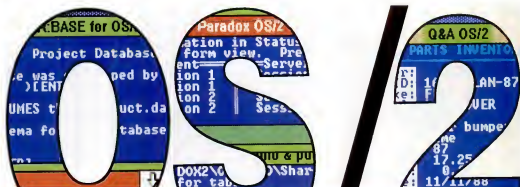
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Thom O'Connor



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Forms Software Fills in the Blanks

Henry Fersko-Weiss/ Almost nothing permeates business as much as paper forms. But PC-based forms-generation programs, a hot new category of software, can help free you from huge paper stockpiles. Like the documents they produce, forms packages come in all shapes and sizes. *PC Labs* examines 16 of these exciting new programs, testing their ability to handle tasks from forms creation to data entry and export 139

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The Elements of Type Style

Edward Mendelson/ Why let your laser printer emulate an ordinary typewriter when there are hundreds of creative, eye-catching fonts to choose from? Whether the look you want is elegant or offbeat, there is no better way to put your personal stamp on a document than by using fonts. *PC Magazine* looks at all the latest PC-based soft fonts and font cartridges as well as the newest font generators, utilities, and editors. We'll show you how to get the most out of your LaserJet or PostScript printer, and also out of your font software 206



Everything you ever wanted to know about fonts, page 206.

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- **Publishers' VGA** combines VGA adapter, image capture
- **The Soft Kicker:** \$69 Ventura Publisher utility makes EGA, VGA monitors mimic full-page displays
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11:05

"Great, back orders are down. Now let's push those sales."

11:06

"Gross Margins look good. We can pick up sales volume with some promotions."

4Payables MultiNet
Praxis Products, Inc.
Business Status Report as of 09/26/88

4Invoice/4Statements		4Payables	
Current Balance:	186532.63	Current Balance:	54632.21
PTD Billings:	55768.15	PTD Payables:	23656.44
PTD Receipts:	53422.23	PTD Payments:	25978.84
PTD COGS:	22475.84	Approved to Pay:	1285.95
Inventory Value:	158412.57		

4Orders		4Purchase	
Open Orders:	8253.76	Open POs:	49783.56
PTD Orders:	54725.43	PTD Orders:	45125.33
PTD Shipments:	55835.12	PTD Receipts:	14937.49

PTD Gross Margin:	33292.31	Net Cash Forecast:	10378.62
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Enter Choice (Forecast/Recalculate/Print/Quit) → 7

11:09

"Cash receipts are up, I can approve a few more P.O.s."

11:10

"Purchase Orders are close to sales this month. I'll call Mary and put the brakes on any more P.O.s for a while."

11:07

"Let's forecast where these numbers will be at the end of the month."

11:08

"Last week's cash forecast was \$4,000. We're looking much better. We can put some into CD's."

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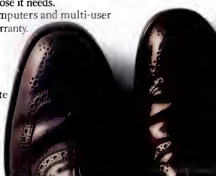
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GE Computer Service



PC MAGAZINE SAYS,
JANUARY 31, 1989

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	40 MB HD 25 mm 1.12	\$3395
	40 MB HD 25 mm 1.12	\$3495
	40 MB HD 25 mm 1.12	\$2795
	40 MB HD 25 mm 1.12	\$2795

Austin 286/12.5 Cache Standard Features:

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- 16 Bit Paradise EEGA Autoswitch Display Adapter
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- 1:1 Fast Transfer Interleaving Controller Card
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- Super PC Kwik Disk Caching Software
- 1 MB RAM (expands to 4 MB on board, 16 MB total)
- Shadow RAM Caching (BIOS Caching)
- EMS LIMM 4.0 Support
- American-Made MotherBoard
- 3.5" 1.44 or 5 1/4" 1.2 MB Floppy Disk Drive
- Phoenix BIOS
- Keytronics Enhanced 101 Keyboard
- 2 Serial Ports & 1 Parallel Port
- 1 PS/2 Mouse Port
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- Fully DOS & OS/2 Compatible

Fully Loaded System . . .

Complete 286/12.5 Cache with EGA Color Monitor, 40MB Hard Drive, 1MB RAM, and 1 Year GE On-Site Service Contract. \$2295.00

AUSTIN 286/12 Comparison Chart

Features	Austin 286-12	Check Competition
GE 1 year on-site service	YES	
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1:1 hard drive controller	YES	
Disk caching software rated as #1 in industry!	YES	
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I/O ports fully integrated	YES	
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Complete at \$2695.00



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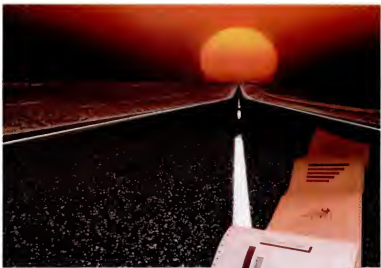
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LETTERS TO PC MAGAZINE



IBM RESPONDS

John Dvorak's column "My Dinner with IBM" (*PC Magazine*, January 31, 1989) is an untrue, mean-spirited personal attack on two IBM employees.

Mr. Dvorak took out of context comments made by one IBM employee concerning IBM's Micro Channel architecture. He fabricated quotes and distorted the facts surrounding a dinner in his outrageous characterization of another IBM employee. The lack of editorial judgment displayed by not checking the quotes and the facts before publishing this column is appalling.

Publication of this material insults the individuals and the IBM company, as well as your readers, and calls into question your editorial standards and credibility.

You owe your readers the correct information, starting with the fact that the two IBM employees did not invite Mr. Dvorak to dinner as he claims. They, in fact, were invited by Mr. Rosch to join a previously arranged social dinner planned by Mr. Rosch, Mr. Dvorak, and their wives.

The IBM employees and your readers deserve an apology.

Donald E. Frischmann
Director
U.S. Marketing and Services
IBM Corp.
White Plains, New York

PC Magazine stands by John C. Dvorak's column as published. We believe it to be factually correct and journalistically proper.—Ed.

PC MAG MAKES THE GRADE

I am a student at Boston University and just breaking into the engineering field, specifically computers. I just want to thank *PC Magazine* for helping to educate me in the world of PCs. Your magazine is a very powerful resource for today's technology, and I find it helpful knowing about products before the purchase. Your programming tips have also helped me out of a few binds along the way. Thanks.

Michael Salerno
Boston, Massachusetts

CARD BORED

Whenever *PC Magazine* arrives, I open it to every cardboard insert, tear them out, and throw them in the wastepaper basket. Then if either of the covers is folded, I use scissors to remove the extra part. Then I am ready to read your fine magazine.

Believe me, I am not alone in this ritual. As a student I regard your magazine as a learning tool, but it's a difficult one to use when trying to thumb through it.

Larry V. Downer
Emmett, Idaho

SEEING THE LIGHT

Just a brief note to let you know I appreciate LITES.COM (Utilities, *PC Magazine*, March 14, 1989). It has proven useful when I have to figure out what is going on with an internal modem in one of our PCs. It even removes itself from memory, too. Keep up the good work.

Ben Myers
Harvard, Massachusetts

SOFTWARE FOR SCIENCE

Your extensive review of scientific software was long awaited and much appreciated ("Scientific Graphing Software: Not

Just a Pretty Picture," *PC Magazine*, March 14, 1989). I must say, however, that far too many of the programs you reviewed have been gathering dust on both my and my colleagues' shelves, basically because the scientific market is too small to nurture quality software.

If it weren't for Turbo Pascal, we'd still be doing everything in C. We are giving up waiting for decent, inexpensive scientific software.

David Holtkamp
Los Alamos, New Mexico

We have been searching for a usable scientific graphics package for over 2 years and were glad to see you reviewed some ("Scientific Graphing Software: Not Just a Pretty Picture"). After reading the article, however, we have mixed feelings.

We found it disappointing that despite the disapproving that of the two Editor's Choices for 2-D packages, one has an infuriating interface and neither accesses Lotus files directly. We are reluctant to spend anything on poorly designed user interfaces, let alone awkward access formats with few good schemes for dealing with data-held spreadsheets. Thanks for trying.

Jay P. Unwin
Kalamazoo, Michigan

GETTING THE STATS STRAIGHT

I read with great interest the series of numerical analysis articles in *PC Magazine's* March 14, 1989, issue. Although the articles were well done and informative, I feel some very important points were either



■ LETTERS

glossed over or omitted. Barry Simon, in his *MathCAD* review, states that scrolling through the program is annoyingly slow ("Better Tools for Higher Math: When Numbers Count"). This is true if one uses the cursor keys for movement, but utilizing the Goto function speeds up the program considerably.

Also, Microsoft's *MuMATH* and Soft Warehouse's *Derive* were overlooked, but both of these programs are more powerful and easier to use than *MathCAD*.

David G. Harris
El Paso, Texas

Well, I guess you missed the boat! There is a common misunderstanding in the lay world that anything to do with computation is numerical analysis. The article by

We were most distressed when we saw your reviews of 49 statistical packages ("Statistical Software for the PC: Testing for Significance").

Since our *ELF-The Statistical Package*, our *EISA/ARIMA Package*, and our *TWG/ARIMA Package* were not covered, however, we question how comprehensive this review could have been.

N. Eric Weiss
The Winchendon Group Inc.
Alexandria, Virginia

Before we get too far away from the numerical/statistical issue, I want you to know how much I enjoyed it. Maybe there's not as much of a demand for this topic as there is for your yearly printer blockbuster, but for at least one issue I get information related to what I do. I hope you'll keep doing these types of articles.

Eric Ramon
San Francisco, California

WAKE UP, GUYS!

For months I have resisted writing to complain, but the burden of silence has become too much. It astonishes me how an organization that is sophisticated enough to generate over 400 pages of news, commentary, and advertising twice a month can put up with the amateurish columns that appear in *PC Magazine*.

In his March 14, 1989, column "A Guide to PIMs, Part 1," Jim Seymour complains about personal information managers that won't let him schedule "a

■ Seymour and Dvorak fell into journalism and now they're too lazy to dig for news.

series of five 10-minute back-to-back interviews with job applicants." Why would anyone take advice from someone who does "10-minute" job interviews? Whether you realize it or not, it's apparent that Mr. Seymour treats his writing assignments with the same respect as his job ap-

Richard Goldstein has the header "Numerical Analysis," but within the first paragraph he incorrectly reduces numerical analysis to statistics ("Understanding Numerical Analysis: Working with the Odds"). Professionals who use numerical analysis and statistics can easily distinguish them, but your issue could not.

You've produced a fine issue on statistics; now I'm looking forward to an issue on numerical analysis.

Kris Stewart
San Diego, California

I was glad to see your statistical and numerical analysis software issue. Ironically, after importing a *dBASE III Plus* file into SAS, I noticed that your table "Advanced Statistical Analysis: Summary of Features" indicates that SAS does not import or export .DIF or .DBF files ("Statistical Software for the PC: Testing for Significance"). Granted there are plenty of problems with SAS, but data import and export are not among them.

Robert Lipton
Venice, California

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■ LETTERS

plicants. When he hits the bricks to make a real living, he'll find out how long a job interview really takes.

Lest you think I dislike Jim Seymour—forsooth!—Dvorak is worse. His Inside Track column in the same issue is simply awful. Is there one piece of news or "inside" anything in this piece?

It's time these guys wake up and smell the coffee. Their writing has become trivial and childish. They fell into journalism, and now they're too lazy to dig for news. They can write only "reactive" articles in the manner of the late 20th-century couch potato.

Clifford Crestodina
Cottage Grove, Oregon

ON THE OTHER HAND...

I thought John C. Dvorak's column "Crazy Mistakes, Part 1" (*PC Magazine*, March 28, 1989) was incredibly entertaining. For "computerphiles" like myself who read each issue from cover to cover—and can't even afford an old PC—it warms my heart to know that there are people less fortunate than myself.

Stephen C. Ridge
Louisville, Kentucky

I absolutely agree with John C. Dvorak's column ("The End of the Computer Dealer," *PC Magazine*, February 14, 1989). Computer dealers in my area must have taken correspondence courses from those in his neighborhood.

I think there is something wrong when customers have to pay a consultant for doing what any good salesman should do for them.

Steve Woolfe
Columbus, Ohio

RIBBON BLUES

I want to echo W. F. Boulton's comments regarding the deadly use of ribbons by the NEC Pinwriter 2200 printer (*Letters, PC Magazine*, January 31, 1989). Had I known of this printer's excessive use of ribbons, I would not have requested its purchase by my company. Now I'm in deep trouble because of the need to purchase so many ribbons.

It would be of great service to your readers to consider testing the rate of use-extendable supplies. There is no way that an

average equipment purchaser can know this, save for trial, error, or hearsay.

Gary Green
Baltimore, Maryland

CORRECTIONS/AMPLIFICATIONS

The maximum number of concurrent sessions allowed by *Concurrent DOS 386* ("When One PC Equals Four: 386 Multitasking Systems," *PC Magazine*, February 28, 1989) is 255.

Worldwide Data, the company that markets *Vaccine* ("Infection Protection," *PC Magazine*, April 25, 1989), has changed its name to Worldwide Software Inc. The new address is 40 Exchange Pl., New York, NY 10005.

The Original Oxford English Dictionary on Compact Disk ("Archives in Miniature," *PC Magazine*, January 31, 1989) is distributed by Oxford Electronic Publishing, Oxford University Press, 200 Madison Ave., New York, NY 10016. For technical support, call (800) 872-2828.

Binary Engineering Software's *Tech*Graph*Pad* performs arithmetic calculations such as data scaling, transpositions, and conversions ("Scientific Graphing Software: Not Just a Pretty Picture," *PC Magazine*, March 14, 1989). The program offers eight symbols, including filled squares, and full control over font and line thickness. The number of plots per graph is unlimited with overlays.

The list price of the version of *SPSS/PC+* reviewed in "Statistical Software for the PC: Testing for Significance" (*PC Magazine*, March 14, 1989) is \$2,375. Additional features include error trapping, ANCOVA, Latin-Square, Split Plot Design, MANCOVA, pie charts, and overlay plots. Graphs can be edited and multiple fonts are supported.

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PC ADVISOR

Advice on creating technical graphs from Lotus 1-2-3 data; finding cataloging software for coin collectors; and turning two computers into a mini-network.



TECHNICAL GRAPHS EASY AS 1-2-3

My company is interested in software packages compatible with Lotus 1-2-3 that will output technical graphs, such as log/log. I have heard of one package called Tech*Graph*Pad by Binary Engineering; are there others that will do the trick?

K. M. Lee
Pittsburgh, Pennsylvania

Of the 1-2-3-compatible graphing packages, only Tech*Graph*Pad (\$395; Binary Engineering, 400 Fifth Ave., Waltham, MA 02154; (617) 890-1812) allows you to directly import worksheet files. Other packages require you to convert your data to .DIF format. Tech*Graph*Pad is also the only package that can create polar plots.

If you're willing to convert data prior to graphing, you'll have some alternatives. Jandel Scientific's Sigma-Plot (\$395; 65 Koch Rd., Corte Madera, CA 94925; (415) 924-8640) was a PC Magazine Editor's Choice for two-dimensional plotting packages ("Scientific Graphing Software: Not Just a Pretty Picture," March 14, 1989), but it imports only .DIF and ASCII files.

For producing basic, unadorned graphs, Graph-in-the-Box Analytic (\$200; New England Software, Greenwich Office Park #3, Greenwich, CT 06831; (203) 625-0062) provides a less-expensive, easy-to-use option. It imports only .DIF files (when creating a .DIF file, be sure to leave the first column of your worksheet blank or your machine will lock up), but it does let you screen-capture data di-

rectly from your worksheet.

Each of these packages has strengths and weaknesses in different areas—ease of use, number of graph types, range of control over labeling—which make a clear-cut decision difficult. All perform some form of curve fitting and allow multiple x- and y-axes. Unfortunately, space precludes a full listing of their graphing options. You might want to read their reviews in the PC Magazine article mentioned above.

TRACKING YOUR COIN COLLECTION

For years I have looked for a program for coin collectors, but I have come up empty.

I have roughly 6,000 coins, from the U.S. and elsewhere, dating back to 1750. I also have proof sets, mint sets, Civil War tokens, and other items. I need a program that will handle all of the above and be able to categorize by date, mint mark, country, condition, gold or silver content, mintage, and other information.

■ You can load an application from the XT and run it on the 386, as well as share most peripherals.

Have you seen any programs that I've missed?

Robert L. Smith
Stuart, Florida

Unfortunately, hard-core collectors in many fields have to fend for themselves when it comes to cataloging their collections. Of the programs that exist, various limitations make them unsuitable for large collections.

Although the simplest solution—buying someone's ready-made database application—may elude you, you do have viable options. You can buy one of these ready-made applications and tweak it to your specifications, or you can create your own from scratch.

One ready-made database to consider is Compu-Quote's Coins/Plus (\$95; annual updates, \$25; 6914 Berquist Ave., Canoga Park, CA 91307; (800) 782-6775, (818) 348-3662). Coins/Plus gives you more than just a structure with which to keep track of your coins: it includes an annually updated database of market prices for more than 2,300 U.S. coins.

Unfortunately, without modification the program might be too inflexible for your needs. You can't enter any of your foreign coins because record entry is tied to a "standard coin number" that the company provides for each coin in its database; hence the program will accept only Uncle Sam's specie.

Since the package uses dBASE-compatible file formats, however, you can import the data and file structure of Coins/Plus into an inexpensive, easy-to-use database

■ PC ADVISOR

such as PC-File:dB (\$89.95; ButtonWare, P.O. Box 96058, Bellevue, WA 98009; (206) 454-0479, (800) J-BUTTON (orders)) and whip it into usable shape.

PERSONAL NETWORKING

I would like to be able to operate my XT clone as a "satellite" of my 386. Since the machines stand all of two feet apart, I would like to connect them through their serial ports. Do you know of any software that would give me this capability?

Mitchell P. Spence
Houston, Texas

Two software packages will let you link your machines with a serial cable. When in use, the software makes the drives of the remote computer appear as local drives; for instance, if the highest drive on the local machine is C:, drive A: on the remote will appear as drive D: on the local. Both packages come equipped with four-headed

cables and support data transfer speeds of up to 115,200 bits per second.

White Crane Systems will sell you The Brooklyn Bridge for \$140 (6400 Atlantic Blvd., #180, Norcross, GA 30071; (404) 446-0660). Originally intended for laptop-to-desktop file transfers, the strength of this package naturally lies in its file-management and transfer capabilities, such as its two-window display of directories.

The necessity that the machines have a master/slave relationship—one controls all the action and the other dumbly provides the information—renders The Brooklyn Bridge slightly less flexible than its competitor, Desk-Link (\$169.95; Traveling Software, 18702 N. Creek Pkwy., Bothell, WA 98011; (206) 483-8088).

Desk-Link turns your computers into equal partners, which is important if you have a peripheral that can't be shared in the XT and you wish to download data directly to the 386 rather than transfer it post

hoc. If you were using The Brooklyn Bridge, you'd need to reverse the master/slave setup. Another possible problem with The Brooklyn Bridge is that it recognizes only COM1 and COM2, while Desk-Link supports up to four COM ports.

On the other hand, Desk-Link requires a whopping 140K of free RAM (31K if you've got expanded memory), while The Brooklyn Bridge needs only 5K.

If you're not wedded to the idea of serial port connectivity and have an extra parallel port on each machine, The Brooklyn Bridge Parallel Version provides the same capabilities at up to 500,000 bps.

ASK THE ADVISOR

Send your questions to PC Advisor, PC Magazine, One Park Avenue, New York, NY, 10016, or upload to PC MagNet (see the "By Modem" sidebar in the Utilities column for access information). Please specify your equipment.

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CIRCLE 231 ON READER SERVICE CARD

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Bill Howard, Executive Editor
PC Magazine, December 27, 1988

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EDITOR'S CHOICE HARDWARE PL



EDITOR'S CHOICE

"The Portacom II is a value leader with memory, a fast drive controller and a terrific keyboard. Most of all, it's cheap, powerful, aluminum...outperformed the other 286's." (Oct. 11, 1988)



"The Dataworld 286(12MHz) AT compatible got the tensor machine of the nine tested in the review." (Sep. 27, 1988)



EDITOR'S CHOICE

"The Dataworld offers a 16-bit video system with a top-quality NEC MultiSync II monitor and an exceptionally fast disk drive controller for an impressive combination of value and performance...From a vendor with an increasing reputation for quality." (Feb. 28, 1989)



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US EDITOR'S CHOICE SOFTWARE

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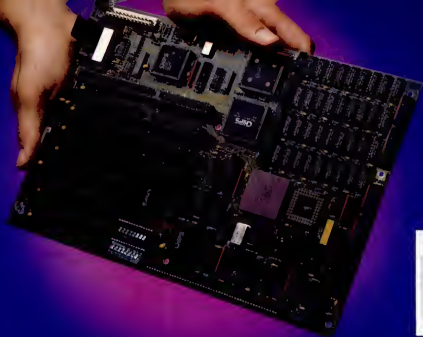
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FIRST LOOKS

Lotus's Magellan: The Fast, Easy Way To Manage a Disk Full of Information

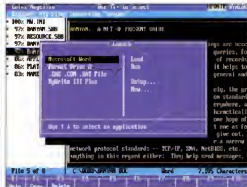
PC HANDS ON

BY BILL HOWARD

Move over, Peter Norton. Lotus's *Magellan* could well be the finest utility ever written for the PC. This program belongs on every PC.

Magellan is a \$139 personal information manager that lets you locate any and every related piece of information on your disk in under 3 seconds, display the information in context, and launch into the program that was the source of the information.

If you've ever had trouble finding information among sev-



Magellan lets you search your disk for words or phrases and then browse each located file. Pressing F7 launches the appropriate application and file.

eral related files on your hard disk, then *Magellan* is a god-send. *Magellan* is the brainchild of Bill Gross, who also developed *HAL*, the natural-language Lotus 1-2-3 interface.

Here's how you might use *Magellan*. Say you're planning to buy dot matrix printers and you've narrowed the choice to the IBM Proprinter, Panasonic, and Okidata. Scattered on your hard disk are LAN e-mail messages about printers, *PC Magazine* printer reviews downloaded from the Computer Database on CompuServe, price comparisons in 1-2-3, and Microsoft Word memos summarizing your

(continues on next page)

T1600 Accepts Second Battery, Boasts 16-Shade Backlit Screen

PC HANDS ON

BY SALVATORE P. RICCIARDI

What are you looking for in a laptop? Is it the lowest weight possible? Or are you willing to lug a few extra pounds in exchange for a higher-performance machine? Either way, you're likely to find the Toshiba T1600 a temptation. At just under 12 pounds and equipped with a 12-MHz 80C286 and a 20MB hard disk, this machine packs a lot of punch in the less-than-12-pound category.

The one thing you won't get with this machine is the security

of several hours of battery life, despite a bit of razzle-dazzle on the part of Toshiba's engineering crew. The T1600 sports room for two rechargeable nickel-cadmium batteries as opposed to the usual one. Even with both batteries installed, however, our evaluation unit averaged only about 1 hour and 40 minutes for normal text editing. With only one battery, you can expect slightly less than 1 hour of life. The second battery adds about 1 pound to the unit's overall weight and an extra \$129 to its cost.

The T1600's display is a pleasure. It's EGA compatible, uses backlit supertwist LCD

technology, and is bigger than the "half-height" displays found on Toshiba's earlier laptops, the T1200 and T1000. It's also one of the most readable displays around. It emulates color using 16 gray scales, adjustable through a software utility. Adjustable brightness and contrast controls are easily accessible in front of the unit. The display is detachable and can be replaced by an optional reflective LCD (not backlit) that uses less power. I'm not exactly sure why you'd want to use it, though. Having to carry around an extra battery seems better than subjecting yourself to a

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The latest way to spruce up Lotus 1-2-3 output 48

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HP LaserJet font cartridges made to order 54

Magellan

(continued from page 13)

plans. Now you need to take one last coherent look at all the information before writing the final proposal.

In *Magellan*, you simply hit the Explore key and type the phrase "dot matrix printer." Inside of 3 seconds on a typical 286 PC with a 40MB hard disk drive, *Magellan*'s "fuzzy search" finds all files with the phrase. A column running down the left side of the screen lists all matching files, ranked by closeness of match. The right side displays the contents of the first matching file. As you run your cursor down the file list, *Magellan* instantly loads viewers for 16 popular programs, so your Word memo appears in Word form; then a fraction of a second later, your DOTMATRIX.WK1 file appears formatted as if you were running Lotus

on-disk that sets *Magellan* apart from dozens of text-retrieval databases, file managers, DOS shells, and hypertext tools. The closest relative to *Magellan* is Traveling Software's \$150 ViewLink (see First Looks, page 34, PC Magazine, March 28, 1989). Both let you create views based on file contents and launch applications linked to file types. ViewLink allows you to group files by date ranges more elegantly than does *Magellan*, while *Magellan*'s program-specific file viewers are superior to ViewLink's generic ASCII text viewer.

Magellan provides an extensive set of utilities that give it many of the attributes of X-Tree, The Norton Commander, and The Norton or Mac Utilities: sorted file and directory views, visual trees, block moves, copies, renames, and deletes. Despite the similarities, these are not interchangeable

macros, rudimentary printing; specific viewers for 1-2-3, dBASE III, and the top word processors (WordPerfect, Word, DisplayWrite, WordStar, MultiMate, and several others); and generic viewers for text and binary files (you see the text portions of programs and graphics files).

How does *Magellan* work so well and so fast? For every word on your hard disk, *Magellan* tracks three pieces of information: the file it's in, its relative position in the file, and the density of the word in the file and the relative density of the word on the entire disk. Amazingly, this every-word index takes up only about 1MB for every 20MB indexed (compared with 30 to 100 percent overhead for typical every-word indexes).

When you search for a phrase, *Magellan* performs a "fuzzy search" and, for example, finds the word *print* as well as *prints*, *printed*, *printer*, and *printing*. A personal letter to your Aunt Dot would partially match dot matrix printer, but it would be displayed well down the list of matches, unless the words *matrix* and *printer* appear in the same letter. Even then, *Magellan* gives higher priority when the words are adjacent. Searches can be restricted to segments of your disk (all *.DOC files or the C:\LOTUS directory) and use Boolean logic ("dot matrix" not "laser").

Your search criteria don't have to be just a few words. You can search for matches from a line in a document or a block of text, and can even use the contents of one document as the search criteria for everything else on your disk. By using a brief text block from this story as the search criteria, I was able to find 33 *Magellan*-related files on a 750-file (20MB) hard disk in about 20 seconds.

After several months of using *Magellan* (including pre-release versions), I found *Magellan*'s greatest value was helping me visualize the links among scattered information; its most common use was daily disk organization and weeding of unneeded files. One neat trick, described in the *Magellan* manual, provides one-key file backup: a

Magellan macro finds and marks files since your last backup, writes them out to a floppy disk, then pipes the list of backed-up files to a disk file that becomes the placemark for your next backup.

Complaints? A few: Some of the dialog boxes will stump you the first several times, there's no way to turn off the error beep (and *Magellan* beeps every time you move the cursor a bit too far), and you can look but you can't edit text files.

Compared with *Agenda*, a self-sorting notebook that was Lotus's first leap into the largely uncharted waters of personal information managers, *Magellan* is far easier to use, and it's priced right at less than \$100 on the street. (The two products are not competitors.) *Magellan* also proves that even big, bulky companies like Lotus can nurture products that are the entrepreneurial visions of one or two people rather than of a corporate committee.

And with all due respect to the product that made Lotus famous, *Magellan* may be the most important and valuable software release from Lotus this year.

PC FACT FILE

Magellan

Lotus Development Corp.

55 Cambridge Pkwy.
Cambridge, MA 02142

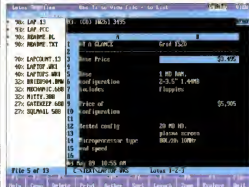
(617) 623-6572

List Price: \$139 (\$179 after June 30, 1989).

Requires: 512K RAM, DOS 2.1 or later.

In Short: An extraordinary disk manager for finding, viewing, and using the information on your PC. *Magellan*'s every-word index lets you find any phrase in less than 3 seconds, see the information instantly through read-only viewers that mimic a dozen popular programs, then run any application linked to the information. Not copy protected.

CIRCLE 44 ON READER SERVICE CARD



Magellan provides read-only file viewers for 16 popular programs, including Lotus 1-2-3, Microsoft Word, dBASE III, and WordPerfect.

1-2-3.

If you want to tweak the 1-2-3 spreadsheet one last time, tap the Launch function key (*Magellan* relies heavily on travel and explorer metaphors), and *Magellan* invokes 1-2-3 and loads the file you were viewing. When you quit 1-2-3, *Magellan* pops back up. Using the viewers, you can clip and paste information from multiple files into one file using the Gather command, creating a quick-and-dirty report.

It's this effortless ability to find, view, and use the informa-

tion on-disk that sets *Magellan* apart from dozens of text-retrieval databases, file managers, DOS shells, and hypertext tools. The closest relative to *Magellan* is Traveling Software's \$150 ViewLink (see First Looks, page 34, PC Magazine, March 28, 1989). Both let you create views based on file contents and launch applications linked to file types. ViewLink allows you to group files by date ranges more elegantly than does *Magellan*, while *Magellan*'s program-specific file viewers are superior to ViewLink's generic ASCII text viewer.

Magellan provides an extensive set of utilities that give it many of the attributes of X-Tree, The Norton Commander, and The Norton or Mac Utilities: sorted file and directory views, visual trees, block moves, copies, renames, and deletes. Despite the similarities, these are not interchangeable

products. You can't undelete an erased file or optimize your hard disk structure with *Magellan*. *Magellan* does many of the things a DOS shell or file manager does, but the shells and managers lack *Magellan*'s sophisticated searching and linking. Because it lets you launch multiple programs (one at a time) far faster than you could quit one program and start another, *Magellan* has some rudimentary aspects of a multitasking operating environment, context switcher, or DOS 4.0.

Other *Magellan* features:

Toshiba T1600

(continued from page 33)

poorer-quality display.

The standard 20MB 27-milisecond hard disk keeps Toshiba competitive with its peers. Other standard equipment includes a 1.44MB floppy disk drive and 1MB of RAM. A parallel port and two 9-pin serial ports are provided, as are ports for an external EGA monitor, an external floppy disk drive, and a dedicated numeric keypad. Bundled with the unit is a copy of Multisoft Corp.'s PC-Kwik disk-caching software and utilities.

The standard 1MB of RAM can be expanded to 5MB using two 2MB memory modules (this capability is a must if you're looking toward the future and you intend to try OS/2 on the machine). The memory above 640K can be used as LIM expanded memory, a RAM-disk, a special feature called hard RAM, or a combination of the three. Hard RAM is just like a RAMdisk except it is nonvolatile. You can also copy the system BIOS from slow ROM memory into RAM for faster operation.

A special feature called AutoResume, when enabled, lets you power-off the unit without saving your work. When you turn it on again, you'll be right back where you left off. This could come in handy if you de-

cide to play Russian roulette with the battery subsystem or if you just need to power-off in a rush.

The spacious 86-key keyboard is an improvement over earlier Toshiba models—it feels more solid and responsive. It supports all 12 function keys and has four dedicated cursor-movement keys. Moreover, Toshiba has the good sense to provide dedicated PgUp, PgDn, Home, and End keys, a must for anyone who spends any time in an editor or word processor. A dedicated function key is used to access the numeric keypad, which is overlayed on the right side of the keyboard. A plastic flip-down stand can raise the back of the machine to an angle that makes typing easier.

Several battery-power-conservation techniques are provided. You can instruct the T1600 to automatically dim the display or stop powering the hard disk after a preset period of inactivity. A "CPU sleep" mode provides an additional means of saving battery power.

The documentation provided is comprehensive and very well illustrated—generally excellent. The unit is shipped with MS-DOS 3.3 and Toshiba's hypertext disk-resident version of the documentation. For some reason Toshiba decided to stop its practice of providing a carrying case with the machine; the case is now a separate purchase

The 12-pound T1600 includes a backlit screen, 20MB hard disk, and improved keyboard.



option.

The T1600 comes with an easy-to-use setup program that lets you set various parameters, such as enabling or disabling the system speaker or the battery-low alarm. You can also set the display type to either EGA, CGA, or monochrome. A keyboard-activated pop-up displays the more important settings and also gives an indication of the remaining battery capacity for both batteries.

An optional 2,400-bit-per-second Hayes-compatible modem can be installed without using the T1600's general-purpose expansion slot. The slot can be used for third-party or Toshiba options, such as the recently announced Toshiba LAN card Ethernet adapter (\$699) or

an expansion chassis interface card (\$199), which connects to a five-slot expansion chassis (\$999).

The T1600 is Toshiba's most powerful battery-operated portable. With a weight of just under 12 pounds and a size that allows it to fit into an airplane tray, it's eminently carryable. In the final analysis, it's a nice system. If the second battery were included in the standard price, it would be an even better buy.

PC FACT FILE

Toshiba T1600

Toshiba America Inc.
Information Systems Division
9740 Irvine Blvd.
Irvine, CA 92718
(800) 457-7777

List Price: \$4,999; second nickel-cadmium battery, \$129. In Short: A 12-MHz hard-disk laptop that weighs less than 12 pounds and sports an excellent backlit screen. An optional second battery provides a total battery life of about 1 hour and 40 minutes.

CIRCLE 448 ON READER SERVICE CARD



Benchmark Tests: Toshiba T1600 vs. Compaq SLT/286

The Toshiba T1600 delivers the performance you'd expect from a 12-MHz 286-based machine. While its system performance matches that of the Compaq SLT/286, the Toshiba's 20MB hard disk lagged somewhat behind.

Performance Times
(Times given in seconds)

	80286 Instruction Mix	Conventional Memory	DOS File Access (small record)	DOS File Access (large record)
Toshiba T1600	5.99	0.87	79.76	13.73
Compaq SLT/286	6.04	0.87	63.81	5.98

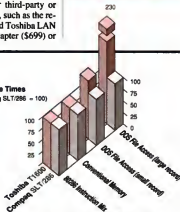
The **80286 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 60,000 instruction code. These instructions are a subset of the total program instruction set.

The **Conventional Memory** benchmark test allocates 256K of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory. The result

shown is the average of the read and write times.

The **DOS File Access** benchmark test measures the throughput rate of the disk being tested. In this case, throughput times are measured in terms of how long the disk takes to perform common DOS file management functions. Five tasks—the creation, sequential file write, sequential file read, random file write, and random file read—are timed and the results summed.

Relative Times
(Compaq SLT/286 = 100)



The test is carried out for two different types of files—small-record files and large-record files—that are used by common PC applications. Files created using small records are typically used by database management programs, and large records are typically used for word processing and spreadsheet files. Loading a DOS program is also simulated by the large-record test.

Carousel 3.0: Task Switcher Enlarges Partitions, Handles Hi-Res Graphics

PC HANDS ON

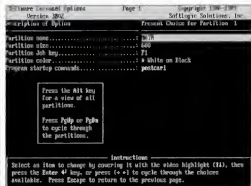
BY BARRY SIMON

While untold numbers of DOS users struggle with DOS multitaskers or wait—patiently or otherwise—for the promise of OS/2, a quiet minority have already found much of what multitasking offers in SoftLogic Solutions' premier task switcher, *Software Carousel*.

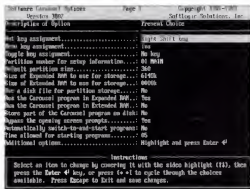
Carousel can't keep your spreadsheet recalculating in the background while you query your *dBASE* files or write that memo you've been putting off, but it can save your place in nearly any application and let you toggle effortlessly from one open application to another. And you'll seldom run into trouble with *Carousel*: unlike most

be no larger than 640K minus the amount of RAM occupied by DOS and *Carousel*. And the

loading the partition that you've requested into conventional memory.



For individual partitions, Version 3.0 of *Carousel* lets you adjust the hotkey and partition size as well as other parameters.



Software Carousel's new installation routine allows you to set many global preferences.

multitaskers, this program is stable and relatively easy to get going.

The latest release of *Carousel*, Version 3.0, adds numerous welcome improvements. The two most important enhancements concern memory management and graphics.

As with past versions of *Carousel*, the total amount of memory your system has available controls the size of your partitions. Each partition must

sum of your partitions can't exceed your system's collective pool of conventional, extended, and expanded memory (you can expand the pool by allocating disk space for swapping, but the time necessary to switch partitions rises drastically). That's because *Carousel* simply stores DOS environments, or partitions, in extended or expanded memory until you call for them with the appropriate hotkey. It then swaps the two partitions,

Version 3.0 improves matters somewhat by placing parts of this—not just your defined partitions—in EMS memory or in the HIMEM region of extended memory. It also no longer requires partition sizes to be in multiples of 16K. Together, these improvements boost the maximum partition size by 20–35K; as for the two systems I tried it on, the increase was 22K and 34K per partition, respectively. In addition, you can now remove *Carousel* from memory without having to go through a rebooting cycle.

The second major improvement solves a limitation of past versions in dealing with graphics screens. If you are willing to allocate enough memory to the available memory pool—about 200K per graphics application—*Carousel* will now save and restore high-resolution EGA and VGA screens. In addition, it also restores unusual text modes, such as the 100 by 60 and the 132 by 45 modes of my Video Seven FastWrite card.

Other new features include support for popular networks, an increase in the allowed number of partitions from 10 to 12, a

menu-driven configuration utility, and the ability to automatically load programs in all partitions at start-up. And perhaps best of all, SoftLogic has finally dropped its obnoxious \$1,000-reward opening screen, meant to thwart the efforts of software pirates.

The only problem I found in this version is a serious incompatibility with *Microsoft Windows 2.10*, which worked fine with *Carousel 2.03*. Shortly after exiting *Windows*, your system is likely to crash. SoftLogic reports that a fix is in the works and is expected for Version 3.01.

With the notable exception of this bug, Version 3.0 improves an already stable, easy-to-use, and worthwhile program. With Version 2.03, I had no conflict with literally hundreds of programs. I find it difficult to imagine using my computer without *Carousel*. This package has become an essential tool and one that I strongly recommend.

PC FACT FILE

Software Carousel, Version 3.0

SoftLogic Solutions, Inc.
1 Penimeter Rd.
Manchester, NH 03103
(800) 272-9900

List Price: \$79.95; upgrade from previous version, \$24.

Requires: 256K RAM (EMS or extended memory strongly recommended), DOS 2.0 or later.

In Short: The premier task switcher has gotten even better. Enhancements include increases in allowable size and number of partitions, and the ability to save and restore most graphics screens. Not copy protected.

CIRCLE 440 ON READER SERVICE CARD

With Glyphix 3.0 changing fonts is as easy as changing your mind.

Glyphix Business Series

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Helvenica
Rockland
Exchequer Script

BASICS II FONT SET

Oxford
Eterna
Classic Typewriter
New York Deco

DECORATIVE FONT SET

University Ormate
Manuscript
Buckingham
Copperfield

BOOK FONT SET

Garamand
Baskerton
Palatine
Century

SANS SERIF FONT SET

Avant Guard
Gibraltar
Bongo Black
Obelisk

FIXED FONT SET

Courier
Prestige
Letter Gothic
IBM Line Draw

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Glyphix Installation Kits for Microsoft Word 5.0 and WordPerfect 5.0 make short work of installing your new Glyphix fonts. It only takes about two minutes to load hundreds of fonts. Then you're ready to use bold, italic, bold italic, outlined and shaded type in every point size from 3 to 120.

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Technical Requirements: Graphic cards require an IBM PC, AT, XT, PS/2 or compatible with 512KB RAM, hard disk, HP LaserJet Series II (5170), LaserJet Plus (3040) or compatible printer. MS-DOS 2.0 or later. Four installation disks are required for Microsoft Word 5.0 and WordPerfect 5.0.

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CIRCLE 299 ON READER SERVICE CARD

Publishers' VGA: \$695 Video Board Combines Image Capture, VGA Adapter

PC HANDS ON

BY WINN L. ROSCH

With the Publishers' VGA, anything you can get on your video monitor can be in your newsletter in a matter of seconds. This \$695 video board from Willow

standard color or monochrome composite-video (RS170) signal, grabs a frame in 1/60 second, and translates the signal into a black-and-white VGA-compatible image, which is displayed at 320- by 200-pixel resolution. Although the VGA design imposes an on-screen limit of 64

vert images between formats (within its resolution limits). In addition, VCAP also allows several image manipulations. You can change brightness and contrast, enhance or smooth edges, and even reverse black and white. A separate utility allows you to alter the size of the captured images and convert them to halftones.

Moving Pictures

The most remarkable part of the system is that the image translations are so fast that you actually get an approximation of a moving video image from the camera or VCR on your screen. Instead of moving smoothly, however, the video motion is somewhat jerky, rendered at a rate of about 7 frames per second instead of the 30 frames per second used by television. Nevertheless, the video-to-VGA translation eliminates the need for an expensive, dedicated video display and is entirely acceptable for capturing stills with a video camera.

The VGA section of the board reaches the high level of hardware compatibility that's now commonplace, thanks to its Tseng Labs VGA chip. In other words, the performance is close but not perfect, with some register manipulations ineffective and diagonal scrolling some-



Publishers' VGA can capture anything you can get on video, including live video and VCR tapes. The image above was captured via a VHS camcorder.

Peripherals combines image capture with a VGA adapter to make image grabbing more straightforward and affordable than ever.

In addition to its low cost—especially considering its dual functionality—the Publishers' VGA cuts costs by eliminating the need for a separate video monitor. Video images go straight from your video camera or VCR to your standard VGA monitor.

Willow markets the dual-function board at a low relative cost because of the integration, not in spite of it: the board's VGA memory doubles as buffer memory for frame grabbing and image manipulation. And that brings the side benefit that captured images are directly accessible by your system's microprocessor, a hook that programmers can latch onto.

Image Capture

As an image-capture board, the Publishers' VGA accepts any

displayable gray levels, a full 256 gray levels can be stored (in some file formats) and printed.

The control software, a program called VCAP, reads and writes six common file formats—TIFF, compressed TIFF, .PCX, .IFF, compressed .IFF, and .EPS—and can con-



Once converted to digital form, images may be adjusted in various ways. Above, the image has been adjusted for contrast and made negative.

PC FACT FILE

Publishers' VGA

Willow Peripherals

190 Willow Ave.

Bronx, NY 10454

(212) 402-0010

(800) 444-1585

List Price: With 256K, \$695;

with 512K, \$845.

Requires: 512K RAM, VGA

display, composite video input

signal.

In Short: A combination VGA adapter/video-image-capture board that offers substantial value and eliminates the need for a dedicated video-capture display.

CIRCLE 482 ON READER SERVICE CARD

what rough. The product's speed also ranks in the vast middle ground of similar 8-bit-interfaced display boards.

Hi-Res VGA

Add a second 256K to the standard 256K on the Publishers' VGA (for an additional \$150 from Willow), and you can access a number of high-resolution modes beyond the VGA standard. These include resolutions up to 1,024 by 768 interlaced in 16 colors, as well as 800 by 600 and 640 by 480 pixels in 256 colors. Willow provides software drivers for Microsoft Windows and GEM to allow compatibility with Aldus's PageMaker and Ventura Publisher.

The board fits a full-length XT-height expansion slot and provides an RCA jack for video input and a 15-pin high-density D-shell for VGA output. Besides sliding the board into place, installation requires nothing more than setting a couple of jumpers.

Add the Publishers' VGA to your PC, and you will have a hassle-free way of adding artwork or anything you can point your video camera at to whatever you publish with your PC. Think of it as a Polaroid without the waste—and without the film.

C>ERASE *.*

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Disk Optimizer comes through again with UnFormat that can instantly restore all the data on your disk to exactly where it was before that little slip of the finger on the keyboard.

And to make sure your data is really safe, the TrackSaver feature protects the surface of your disk from excessive wear by preventing the head on your drive from spinning over the same track for too long. And the Refresh program prevents the bad spots that develop on disks due to fading magnetic charges.

Still the safest buy in performance optimizers.

As always, Disk Optimizer also gives you the safest, most advanced performance optimization available—proven by over a quarter of a million users.

The Optimize program speeds up disk reading and writing times by up to 300 percent by un-doing the file fragmentation that takes place

naturally over time. And now, all sizes of hard disks can be protected! Disk Optimizer 4.0 fully supports DOS 4.0, so that even high capacity drives can be safe and reliable. If your applications require a hard disk of more than 30 MB, Disk Optimizer 4.0 is for you.

A total of 17 different programs.

Disk Optimizer includes Findfile for locating files by name or wildcard anywhere on your disk. Sorts for rearranging files and directories in the way that makes sense to you. Lock and Unlock for password-protected file security. Killfile for erasing sensitive data permanently. And lots more.

In all, there are 17 different programs in the new Disk Optimizer. Each one designed to improve performance, guard your data, and make disk management easier and simpler for everyone.

So get new Disk Optimizer 4.0, and get more than the courage to say yes. Get the peace of mind and total confidence that your disk is running better and safer all the time.



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CIRCLE 334 ON READER SERVICE CARD

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PIPELINE

TOP TEN SELLERS — A 5-Week History

A late tax-season surge affected this week's list. *TurboTax/1040* from ChipSoft made what will probably be its final appearance for the year.

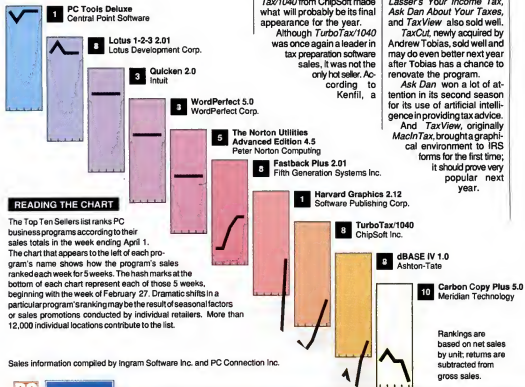
Although *TurboTax/1040* was once again a leader in tax preparation software sales, it was not the only hot seller. According to Kenfil, a

major software distributor, Andrew Tobias' *TaxCut*, J. K. Lasser's *Your Income Tax*, Ask Dan About Your Taxes, and *TaxView* also sold well.

TaxCut, newly acquired by Andrew Tobias, sold well and may do even better next year after Tobias has a chance to renovate the program.

Ask Dan won a lot of attention in its second season for its use of artificial intelligence in providing tax advice.

And *TaxView*, originally *MacInTax*, brought a graphical environment to IRS forms for the first time; it should prove very popular next year.

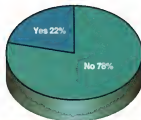


SURVEY

9,600-bit-per-second modems have been available for a couple of years now, and the switch from 1,200 and 2,400 to 9,600 bps is happening slowly.

There are compatibility issues, since few 9,600-bps modems talk to models from other manufacturers. But some jobs require the speed. A survey of PC MagNet callers showed that Hayes, although not one of the first entrants in the market, has claimed a major share of the sales.

Does your company use high-speed (9,600-bps and up) dial-up modems?



DOES THE OS/2 GPI NEED ITS OWN PRINTER?

OS/2's graphical display is out and slowly making its way onto desktops, yet major questions on printing are still unresolved.

IBM's initial shipment supported only IBM printers, ignoring the millions of Epsoms, HPs, Okidatas, and the rest. That's not a real problem: drivers for these printers will be shipped when major applications appear. Epson, for example, has shipped OS/2 printer drivers for all of its 9- and 24-pin printers to Microsoft. They'll end up on the OS/2 disks sold by PC makers in coming months.

The larger issue is an efficient page description standard. The GPI (Graphics Programming Interface) is at the heart of OS/2; it responds to software instructions to draw the characters and graphics on-screen. Right now, it's still unclear which is the best way to print GPI output.

PostScript, of course, has had modest success in establishing a graphical page description standard, in spite of the more-than-\$5,000 investment it requires.

Most office laser printers, however, use HPGL, Hewlett-Packard's graphics language for page description—a less de-

manding, less expensive way to control printing.

In OS/2's graphical environment, both standards will prove lacking.

PostScript is built around a family of algorithms that draw fonts using a character-set table. HPGL uses bit-mapped fonts that are stored in one of three places: internally, on font cartridges, or on-disk for

peruse; since PostScript is licensed by Adobe, PostScript printers cost more. Microsoft could license Adobe's Display PostScript drivers, but that would increase OS/2's price.

HPGL printers, lacking a graphics processor, will have to wait for the PC to do all the rasterization of fonts and graphics before printing GPI output.

Among the solutions in the works are GPI printers. QMS is taking the initiative. The com-

OS/2's graphical display is out, yet major questions on printing are still unresolved.

pany has announced a printer,

but before it goes into production QMS is waiting until OS/2 developers have had a chance to consider its plan and Microsoft has made some final changes to the GPI specification.

QMS's GPI printer will be built around Texas Instruments' 34010 graphics processor. It will be programmed from disk files, downloading font outline instructions and converting the vector information to raster commands on the fly. Both a laser and color thermal printer are planned.

Microsoft has yet to select a font library that will fold into

downloaded.

The GPI in OS/2 builds fonts using a curve- and line-drawing technique. Font drivers generate character outlines on the fly using curves and lines as building blocks.

There will be PostScript drivers for OS/2, but it's unlikely that the GPI will work smoothly with PostScript. The differences between the two technologies will result in significant differences between on-screen and printed pages, resulting in a "what-you-see-is-almost-what-you-get" display.

And then there's the expensive way to control printing.

RAM Shortage Eases

The laws of supply and demand are still alive in the RAM market. Last fall's shortage and price hikes have given way to a springtime surplus and price cuts.

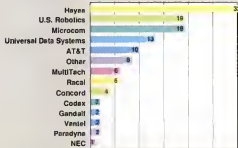
I.C. Express, a component retailer in City of Industry, California, is now selling 100-nanosecond 100-megabit chips for \$20; last October they sold for \$38. In the same period, 150-ns. 256-kilobit chips dropped from \$10.95 to \$7.75.

And there's more good news on the horizon. Toshiba has begun commercial shipment of its 4Mb chips. They'll first be sold in the T5200.

Signposts

Last fall, I reported that Chips and Technologies was developing a family of 32-CMOS chips that would provide all the major functions needed to build a small laptop. In April, Chips and Technologies announced shipment of the 82C455 flat-panel/CRT VGA controller chip. —Gus Venditto

Which manufacturer's high-speed modems are being used?



For which applications are high-speed modems used?



IN ALL FAIRNESS, YOU SHOULD READ WHAT ASHTON-TATE* IS SAYING BEFORE YOU PURCHASE ORACLE.

Ashton-Tate Fights SQL Bugs Same Query Run Twice Can Result in Different Repties

Ashton-Tate last week acknowledged that the Structured Query Language (SQL) portion of dBASE IV can produce inconsistent and inaccurate results. The crux of the SQL problems lies with those situations that occur when data is structured in a specific way, according to Ken Richardson, a spokesman for the Berkeley, Calif., firm. As a result, the same query run two different times can result in two different replies. For example, if a query

can retrieve incomplete information from the database (See Chart, Page 8.)

Ashton-Tate does not plan to issue a software fix to the problem, it is, however, offering several solutions to users through its support team and hot help line, and on CompuServe, Richardson said.

Though Ashton-Tate is characterizing dBASE IV's SQL problems as "minor" and confined to specific circumstances, database experts claim their impact is more serious.

"The SQL in dBASE IV is volatile, unreliable and unpredictable," said Richard Polakowski, president of Performance Consulting Inc., a database consulting firm in Chicago.

"I don't see how anyone can use it," he added. "They'd have to know the answer to the SQL query ahead of time."

Surprisingly, the majority of dBASE users were unaware of dBASE IV's SQL direction. "The direction in SQL are on

See dBASE, Page 8

PC Week, January 9, 1989

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Publisher's Powerpak: Low-Cost Scalable Fonts for Ventura, PFS:First Publisher

PC HANDS ON

BY EDWARD MENDELSON

Not ready to spend \$4,000 on a PostScript printer? Atech Software's *Publisher's Powerpak* gives you scalable fonts in *Ventura Publisher* for \$199.95 or in *PFS:First Publisher* for \$79.95.

The quality of Atech Software's fonts won't exactly make PostScript's typographers turn green with envy. But *Publisher's Powerpak* brings reasonably good-looking scalable type to any of 250 dot matrix, ink-jet, and laser printers, from the humble Epson FX-80 to the HP Laserjets and the NEC Silentwriter. If your printer isn't supported, it probably doesn't really exist.

The *Ventura* version generates fonts in sizes from 6 to 250 points; the *First Publisher* version stops at 72 points. The fonts look their best when you print in sizes of 20 points and larger. Anything smaller is acceptable if you don't mind rough-hewn type with uneven spacing between characters.

The package comes with versions of Times Roman, Helvetica, and Courier in the *Ventura* character set. Instead of true italics and bold, you'll have to live with sloped and darkened versions of the normal fonts. But a font manager that comes with the disk lets you produce narrow, wide, hollow, and other variations of type and create screen fonts to match.

Three add-on font packages (\$49.95 for *Ventura*, \$29.95 for *First Publisher*) contain two typefaces each; a fourth package has symbols, dingbats, and a script font.

Publisher's Powerpak installs easily and automatically and doesn't get in the way of any normal *Ventura* functions. It generates its fonts in your computer's memory faster than most PostScript printers can in their own memory. Even if you use an HP LaserJet, the package may be worth buying for occa-

36 Point *Italic*
24 Point *Italic* AB
24 Point *Italic* ABCI
18 Point *Italic* Bold ABC
18 Point *Italic* Bold ABCDI
12 Point *Italic* Bold ABCDEFGHIJKL
12 Point *Italic* Bold ABCDEFGHIJKLM
12 point *Italic* Bold ABCDEFGH
8 point *Italic* Bold ABCDEFGHIJKLMNOPQRSTU

Publisher's Powerpak lets you choose any size type in its versions of Times Roman, Helvetica, and Courier. Letter spacing tends to be uneven.

Ventura Publisher Utility Emulates High-Resolution, Full-Page Display

PC HANDS ON

BY EDWARD MENDELSON

If your wrist aches from endlessly moving the mouse along the scroll bars in *Ventura Publisher*, Aristocad's *The Soft Kicker* may be the muscle relaxant you need. This \$69 utility "kicks" your EGA or VGA into emulating a megadollar full-page monitor.

When you run *Ventura* with *The Soft Kicker*, your VGA or EGA monitor acts like a window that lets you see part of an imaginary full-page 1,024 by 1,024 monitor. You simply enter text or move the mouse until the cursor reaches the edge of the screen, and different parts of the full page pan instantly into view. The program stores the whole page in the hardware memory of your EGA or VGA adapter, so you don't have to manipulate the scroll bars and then wait for the screen to repaint every time you want to type beyond the edge of the screen.

If you press the right mouse button, you switch to *The Soft Kicker's* reduced view, in which the whole page appears on-screen (three-fourths of the page with an EGA). And, unlike *Ventura's* built-in reduced view, *The Soft Kicker* also gives you a small window in which you can edit a few square inches of the page at full scale. The small window follows the cursor as you type or edit, and the mouse lets you move any area of the page into the window for editing.

For an additional \$109, *The Soft Kicker Plus* adds monochrome EGA and VGA drivers for *Microsoft Windows*. These drivers provide the same 1,024 by 1,024 "virtual monitor" that *The Soft Kicker* alone provides for *Ventura*, but you don't get the reduced view or small editing window with the *Windows* drivers.

The Soft Kicker has two minor inconveniences. In full-scale mode, *Ventura's* menus scroll off the top of the screen when you scroll to the bottom of

sional use with extra-large fonts. With many dot-matrix printers, *Publisher's Powerpak* adds capabilities you won't find anywhere else.

Atech has just begun shipping a \$139.95 version of its package for *Microsoft Word* and *WordPerfect*. This latest release of *Publisher's Powerpak* will add new capabilities for dot-matrix printers, though anyone using a laser printer with those two programs will get much better scalable fonts from SWFTE International's *Glyphix*.

List Price: *Publisher's Powerpak*: \$199.95 (for *Ventura Publisher*), \$79.95 (for *PFS:First Publisher*). **Requires:** 512K RAM, hard disk, supported printer, DOS 2.0 or later. Not copy protected. Atech Software, 629 S. Rancho Santa Fe Rd., #367, San Marcos, CA 92069, (619) 438-6883.

CIRCLE 435 ON READER SERVICE CARD

a page. And in reduced-scale mode, the small window can't be enlarged or reshaped. If all goes according to plan, both inconveniences should be fixed around the time you read this, and users who've already purchased the package can get low-cost upgrades.

The only other problem you may experience with Aristocad's *The Soft Kicker* is a temptation to pull the bevel off your monitor to get a better view of the imaginary full-page monitor that seems to be hidden tantalizingly behind it.

List Price: *The Soft Kicker*, \$99; *The Soft Kicker Plus* (with *Microsoft Windows* drivers), \$139. **Requires:** *Ventura Publisher* or *Professional Extension* (no additional RAM required); EGA or VGA graphics card (Genoa Super EGA and ATI EGA Wonder cards not compatible), DOS 2.0 or later. Not copy protected. Aristocad Inc., 1650 Centre Pointe Dr., Milpitas, CA 95035; (800) 338-2629, (800) 426-8288 (in Calif.).

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CIRCLE 309 ON READER SERVICE CARD

\$495 ShortCut Adds 12.5-MHz 286 To Nearly Any XT-Class Machine

PC HANDS ON

BY WINN L. ROSCH

While 286 accelerator boards can breathe new life into your aging PC, they often carry a price as high as you might pay for a new AT compatible. The ShortCut, from Tallgrass Technologies, trims not only the size of the board—to a mere 5 inches—but also the price, to \$495 retail.

The ShortCut is no performance midget—its 80286 microprocessor runs at a full 12.5 MHz with a 16K zero-wait-state CMOS static RAM cache—good enough to beat an IBM PC AT's performance on a great majority of the PC Labs benchmark tests.

Besides speed, the big selling point of the ShortCut is compatibility. It runs DOS without a hitch and offers the promise of bringing OS/2 to your humble 8-bit PC. Moreover, it works with machines based on the Intel 8088 and 8086 or the NEC V20 and V30. In addition to pure 8088-based IBM PCs,XTs, and compatibles, the laundry list of supported computers includes the IBM PS/2 Model 30, the Compaq

Deskpro, the AT&T 6300 (and its Olivetti prototype), the Leading Edge Model D, and many others.

The ShortCut bears more than a superficial resemblance to the SOTA 286i accelerator card, and with good reason: SOTA Technology handled a large part of the ShortCut's development for Tallgrass. The Tallgrass contributions include extra firmware that solves some boot-up problems with the IBM PS/2 Model 30, as well as a solid 2-year warranty.

In our evaluation unit, the add-on boot-up firmware took the form of a daughtercard. Starting in early April, the new code will be part of the main ShortCut circuitry. Tallgrass will upgrade or exchange earlier boards.

As with the SOTA board, running OS/2 on the ShortCut means adding a promised but not yet available memory daughtercard that also includes an AT BIOS, clock, and support circuitry. The \$295 (with no memory) daughtercard is due for summer release and will add up to 8MB of high-speed direct-access 16-bit memory. This memory will also be usable as expanded memory under the

EMS 4.0 specification.

As a replacement-style accelerator, the ShortCut requires you to pull out the native microprocessor and slide a plug and extension cable into its place. Plug both your old microprocessor and the other end of the extension cable into the ShortCut, drop the combination into any vacant slot (except the XT's infamous slot eight), and you're in business. A toggle switch on the retaining bracket of the 5-inch board gives you the option of running the new 80286 or your old processor. You must reboot when you change processors, but you'll rarely have the need to do so.

To gain full power from the board, you have to install a driver for the ShortCut's cache memory in your system's CONFIG.SYS file. Tallgrass also supplies a disk-caching program so that the rest of your system can better keep up with the quick thinking of its new 12.5-MHz brain.

With its memory cache inactive, the ShortCut scores hardly better than your old microprocessor on most benchmark tests. Turn on the ShortCut cache driver, however, and per-

PC FACT FILE

ShortCut

Tallgrass Technologies Corp.
11100 W. 82nd St.
Overland Park, KS 66214
(800) 825-4727
(913) 492-6002

List Price: \$495; memory expansion (required for OS/2), \$295 without RAM.

Requires: 64K RAM; compatible 8088-, 8086-, V20-, or V30-based computer; one floppy disk drive.

Is Short: A well-designed 12.5-MHz 286 accelerator that works in a wide range of XT-class machines and offers options for OS/2 compatibility.

CIRCLE 481 ON READER SERVICE CARD

formance accelerates beyond the AT rate on most tests, at best doubling it on pure calculations. When the cache is thwarted by tests like PC Labs' NOP routine, the ShortCut regresses to the performance level of your system's stock microprocessor.

Subjectively, the ShortCut cache adds a speedy feel to most applications. It runs smoothly, with no visible jerkiness to its video displays. Overall, it's a well-integrated and relatively inexpensive way to enliven lag-gardly PCs.

PC LABS

Benchmark Tests: ShortCut vs. SOTA 286i and 8-MHz IBM PC AT

Since the ShortCut accelerator board is a revamped version of the SOTA 286i, it's not surprising that the two perform comparably. As the NOP benchmark test indicates, the ShortCut also shares the one drawback of the SOTA: It relies on a 16K static RAM cache to speed up the IBM PC-XT's plodding memory.

Performance Times (Times given in seconds)

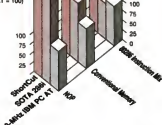
	NOP	Conventional Memory	80286 Instruction Mix
ShortCut	13.08	1.87	8.02
SOTA 286i	13.07	1.87	7.96
8-MHz IBM PC AT	4.19	1.27	8.82

The **NOP** benchmark test is designed to measure raw clock speed and memory access time while minimizing differences in microprocessors and the effect of memory caching. This test executes almost nothing but NOP ("No Operation") machine code instructions in a big 128K loop.

The **Conventional Memory** benchmark test allocates 256K of conventional memory and treats it as a series of 64-byte records. Then, 16,384 random records are read into and written from this memory. The result shown is the average of the read and write times.

The **80286 Instruction Mix** benchmark test measures the time it takes to execute a selected series of processor-intensive tasks. The test program uses 80286 instruction code. These instructions are a subset of the total processor instruction set.

Relative Times
(8-MHz IBM PC AT = 100)



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Dac Easy Word Checks Punctuation

PC HANDS ON

BY CRAIG STINSON

Dac Easy Word 3.0, is an entry-level word processor more suitable for memos and letters than long and highly formatted documents. However, this \$69.95 package includes a few juicy features more typical of pricier products.

For example, spell checking and macros are built in. The spelling checker includes a browse-dictionary option that will help you find correct spellings. This version of *Dac Easy Word* also adds a punctuation checker that ferrets out unbalanced parentheses and brackets as well as sentences that begin with lowercase letters.

The macro facility can record and play back both text and commands, so it can be used for entering and formatting routine headers, addresses, and boilerplate paragraphs. Macros are assigned to Ctrl-alphabet-key combinations, which means you can have 26 of them active at any time.

Dac Easy Word 3.0 also does windows (up to four can be open at once, zoomed or tiled) and even includes a miniature flat-file-database module that allows you to create mailing lists and merge them with form letters.

Unfortunately, *Dac Easy Word* doesn't handle the more mundane business of processing words as gracefully as one would like. For starters, it appears to have been designed with only floppy-disk systems in mind. It starts out by assuming that data files will be stored on drive B:. You can establish a new default data directory during the installation procedure, but you can't override the default by including a path and filename in the Open or Save command.

The program paginates interactively, but it insists on leaving large gaps between the bottom of one page and the top of the next to represent top and bottom margins. The gaps not only occupy precious screen

space, but also make for jerky scrolling.

In addition, certain commands produce display win-

dows, which *Dac Easy Word* insists on drawing line by line; even on a 386 machine with VGA, these are slow-motion



Dac Easy Word 3.0 allows up to four windows open at once. Macros can include both commands and text and are assigned to Ctrl-letter combinations.

concentration breakers.

What *Dac Easy Word* appears best suited for is interacting with *Dac's* accounting software. This version of the program automatically accepts data from *Dac Easy Accounting*, Versions 2.0 and 3.0, and *Dac Easy Payroll*, Version 2.0 and 3.0. Users of these products whose word processing needs are modest and occasional may find *Dac Easy Word 3.0* an ideal tool. Others are likely to find it neither fish nor fowl—not usable enough as a low-end word processor and not strong enough to qualify as a budget-class power tool.

List Price: *Dac Easy Word*, Version 3.0, \$69.95; upgrade from Version 2.0, \$35. **Requires:** 256K RAM, DOS 2.0 or later. Not copy protected. *Dac Software Inc.*, 17950 Preston Rd., #800, Dallas, TX 75252; (214) 248-0905.

CIRCLE 442 ON READER SERVICE CARD

DataType: Lotus 1-2-3 Print Enhancer

PC HANDS ON

BY CRAIG STINSON

From the headline in SWFTE International's ads "LaserJet Font Power in 1-2-3," you might assume that *DataType* is a direct competitor to *Allways* and *Impress*—the latest and greatest add-ins for enhancing *Lotus 1-2-3* output. If so, you'd be greatly mistaken. *DataType* is much more comparable to *Funk Software's Sideswys*, except that it's designed specifically for HP LaserJets. *DataType's* main virtue is that it lets you put more words and numbers on a printed page.

DataType lets you choose landscape or portrait orientation, point sizes from 6 to 14 at whole-number increments, and line spacing settings from 4 lines per inch to 12. The lines-per-inch parameter defaults to a value appropriate to the current point size, so you don't ordinarily need to alter it when you change point sizes.

DataType offers only one typeface, Letter Gothic, and it doesn't do bold or italics; clear-

ly, this is no DTP package. But the typeface is well suited for spreadsheet printing. Even though the Letter Gothic is not proportionally spaced, the *DataType* fonts look more typeset than Courier. And even if you choose to print in 12 point (the size of the LaserJet's built-in Courier), you'll print about 15 percent more characters per line with *DataType* than without it.

SWFTE's Letter Gothic includes a couple of worthwhile goodies. First, the hyphens and equals signs have been modified to extend to the full width of the character space, so you can have connected single and double underscores. Second, the SWFTE fonts can be configured to include the *Lotus International Character Set* (LICS).

Unfortunately, the current version of *DataType* has a few pesky problems. For example, each time you download new font information, *DataType* kicks out any partially printed page in your LaserJet, so it's not possible to mix type sizes on the same page. And if you change the lines-per-inch setting, you have to manually invoke *Data-*

Type's Initialize command to download the new setting.

In addition, this version has a bug that could cause you to lose unsaved data. If you happen to hit the /Print Printer Page command without having first defined an output range, *DataType* goes mad and invokes the PrintScreen interrupt continuously. You have to reboot to restore order. (SWFTE says a fix is coming.)

DataType's biggest problem is that it's too limited, although it's easy to use and generates prettier and more versatile output than does *Sideswys*. But you have to have an HP LaserJet or compatible. And, at \$89.95, it's priced too close to *Allways* (\$149.95) and *Impress* (\$139.95), both of which do so much more.

List Price: *DataType*, \$89.95. **Requires:** 10K free RAM after loading *Lotus 1-2-3*, Release 2; HP LaserJet or compatible; DOS 2.0 or later. Not copy protected. SWFTE International Ltd., P.O. Box 5773, Wilmington, DE 19808; (302) 429-8434.

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NEW ON THE MARKET

by Lori Grunin

560-cps Dot Matrix Printer Handles the Heavy Jobs

Laser printers may be the glamorous machines of the office, but the dot-matrix workhorse still reigns at printing multiple-part forms and labels. Now, for \$1,995, you can see output at a burst rate of 560 characters per second, according to **Output Technology Corp.**

The two printheads of the Output 560DL printer simultaneously produce characters at a

resolution of 240 dots per inch and a maximum throughput of 380 cps. You can feed up to 16-inch-wide paper through either the front or the bottom of the printer.

The printer emulates both the Epson FX-100 and the IBM Proprinter XL, and it features built-in bar codes.

List Price: Output 560DL, \$1,995. Output Technology Corp., East 9922 Montgomery, Spokane, WA 99206; (509) 926-3855.

CIRCLE 458 ON READER SERVICE CARD



The Output 560DL dot matrix printer can be controlled via membrane switches on the front panel.

HotShot Presents Incorporates Bidirectional Outliner

To streamline the process of creating presentations, **Symsoft** has endowed its \$349 presentation graphics package, **HotShot Presents**, with a bidirectional outliner that lets you enter text either into the outline or directly onto a slide.

When you enter text onto the slide, **HotShot Presents** automatically generates an outline; if entered in the outline, the text is added to the slide. Other outliner features include cut-and-paste and slide sequencing.

HotShot Presents also lets you create templates of often-used configurations, such as borders, slide colors, and fonts. The software offers 11 transition effects, including weave, replace, iris, rain, and diagonal. Presentations can be self-running, manual, or interactive.

In addition to offering a screen-capture capability, the program will import graphics in

.PCX, .IMG, .TIF, .WPG, .MSP, *MacPaint*, .CGM, .HPGL, .DXF, .PIC, and .WK? file formats. File filters for *AutoCAD*, *HPGL*, and *.CGM* cost \$150 each. **HotShot Presents** supports the Polaroid Palette Slide Maker and HP LaserJet-, PostScript-, and Epson-compatible printers, as well as the HP PaintJet.

List Price: **HotShot Presents**, \$349; file filters, \$150 each. Requires: 640K RAM, graphics adapter, DOS 2.1 or later. Not copy protected. Symsoft Corp., 444 First St., Los Altos, CA 94022; (415) 941-1552.

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Fox Software adds a dimension to data with **FoxGraph**, a \$295 package that creates two- and three-dimensional graphs from *dBASE*-compatible files.

Based on Three D Graphics

Inc.'s *Perspective*, **FoxGraph** creates 32 types of 3-D graphs and 15 types of 2-D graphs with tools such as 3-D rotation, translation, zoom, pan, and distortion control. **FoxGraph** imports .DIF, .SYLK, .WK?, and ASCII files and exports .IMG

and .TIF files.

List Price: **FoxGraph**, \$295. Requires: 640K RAM, graphics adapter, DOS 2.1 or later. Fox Software, 118 W. South Boundary, Perrysburg, OH 43551; (419) 874-0162.

CIRCLE 448 ON READER SERVICE CARD

HOT PROSPECT

AST, Gateway 2000 Offer 33-MHz 80386s

AST Research and **Gateway 2000** are just two of the companies at the forefront of an incoming wave of machines based on the 33-MHz 80386 processor.

The modular **AST Premium 386/33** (\$6,595) features a 32-bit plug-in CPU card that houses the processor, a 32K static-RAM memory cache governed by an Intel 82385 cache controller, and sockets for an 80387 coprocessor and up to 4MB RAM (the standard configuration has 2MB). A floppy disk drive controller, embedded AT hard disk interface, two serial ports, and one parallel port reside on the motherboard.

Expansion capacity comes in the form of six free slots (two 32/16-bit, three 16-bit, and one 8-bit). Three half-height drive bays open to the front and two half-height internal drive bays are present.

AST offers three versions of the system: the hard-diskless Model 5 (\$6,595); the Model 105 (\$8,595), outfitted with a 110MB 16-millisecond hard disk drive; and the Model 325 (\$11,195), equipped with a 320MB 16-ms. ESDI drive.

A 32-bit plug-in CPU card holds the 33-MHz processor in the **AST Premium 386/33**.

The \$6,995 **Gateway 2000 33-MHz 80386** uses traditional motherboard architecture. Standard configuration includes a 128K static-RAM cache, a 150MB hard disk drive, both 3½-inch and 5¼-inch high-density floppy disk drives, and a 16-bit VGA card with an NEC 3-D display.

List Price: **AST Premium 386/33**, Model 5, \$6,595; Model 105, \$8,595; Model 325, \$11,195. **AST Research Inc.**, 2121 Alton Ave., Irvine, CA 92714; (714) 863-1333.

CIRCLE 453 ON READER SERVICE CARD

List Price: **Gateway 2000 33-MHz 80386**, \$6,995. **Gateway 2000**, 106 W. 8th St., P.O. Box 2000, Sergeant Bluff, IA 51054; (712) 943-2000, (800) 233-8472.

CIRCLE 454 ON READER SERVICE CARD



NEW ON THE MARKET

PC Macsyma Brings Symbolic Math From Mainframes to the PC

Are you a power user with a need for power math tools? If so, you're a likely candidate for **PC Macsyma**, Symbolics' \$2,900 software equivalent of a research assistant: it performs symbolic and numeric computation and graphs the output. Symbolics ported the program from mainframes and minicomputers to run under the *Microsoft Windows* environment.

PC Macsyma lets algebra junkies find exact, approximate, and numerical solutions to systems of equations and perform basic and advanced matrix operations such as orthogonalization and finding generalized inverses.

Calculus capabilities include bidirectional limits, partial differentiation and integration of unknown functions, and evaluation of indefinite integrals. **PC Macsyma** also performs vector, indicial, and component tensor calculus, as well as exterior calculus of differential forms.

When you've finished number and equation crunching, you

can create two- or three-dimensional plots of your results. Graph types include parametric, adaptive density, and contour plots, and those containing the plotting of vector fields, lists of points, and functional relationships.

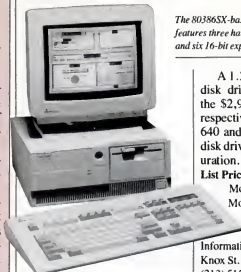
PC Macsyma has a compiler, debugger, and code generator for C, FORTRAN, and TeX. The software runs under a memory management environment called CLOE, which provides "garbage collection"—ensuring that unused data is cleared out from memory—and the ability to address up to 16MB of memory.

List Price: **PC Macsyma**, \$2,900. Academic discounts available.

Requires: 80386-based system, 4MB RAM (6MB recommended), 40MB free disk space, DOS 3.x. Copy protected. Symbolics Inc., Computer Aided Mathematics Group, 8 New England Executive Park, Burlington, MA 01803; (617) 221-1250.

CIRCLE 455 ON READER SERVICE CARD

Mitsubishi Offers \$3,000 386SX System



The 80386SX-based Mitsubishi MP386s features three half-height drive bays and six 16-bit expansion slots.

A 1.2MB or 1.44MB floppy disk drive comes standard on the \$2,995 Model 610 or 615, respectively; the \$3,995 Models 640 and 645 add a 40MB hard disk drive to the diskless configuration.

List Price: Mitsubishi MP386s, Models 610 and 615, \$2,995; Models 640 and 645, \$3,995.

Mitsubishi Electronics America Inc., Information Systems Division, 991 Knox St., Torrance, CA 90502; (213) 515-3993.

CIRCLE 459 ON READER SERVICE CARD

Mitsubishi Electronics America, believing that an 80386SX-based machine offers a foot in the door to current high-end PC computing, now offers users the \$2,995 MP386s.

The zero-wait-state machine is based on a 16-MHz 80386SX processor. Standard configurations include 2MB on-board RAM, six 16-bit expansion slots, an 80387 SX socket, two 9-pin serial ports, a parallel port, a drive controller, and MS-DOS 3.3.

Correct Grammar Comes to WordPerfect

For those times when you're not sure if you've used *les mots justes*, **Lifetree** offers Houghton-Mifflin's **Correct Grammar** for use with **WordPerfect**, Versions 4.2 and 5.0. The \$99 grammar-correction package analyzes sentences for errors of usage, as in spelling, hyphenation, punctuation, and choice of words, as well as for typographical and word processing errors.

Using its 135,000-word linguistic dictionary, **Correct Grammar** provides three levels of error messages: one-line messages, longer explanations with examples, and tutorials. The program uses the same interface as **WordPerfect** and retains all formatting codes.

List Price: **Correct Grammar** for **WordPerfect 4.2 and 5.0**, \$99.

Requires: 440K available RAM (380K on a PS/2 or when using a 256K EGA or VGA card); **WordPerfect**, Version 4.2 or 5.0; hard disk. Not copy protected. Lifetree Software Inc., 411 Pacific St., Monterey, CA 93940; (408) 373-4718, (800) 543-3873.

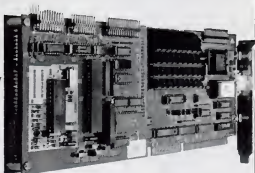
CIRCLE 457 ON READER SERVICE CARD

Controller Harnesses Any Mass-Storage Device

If you need to juggle storage devices ranging from floppy to erasable optical disk drives, the **hyperSTORE-816 SPU** (Storage Processing Unit) provides a one-controller solution to your multimedia problem.

Perceptice Solutions' \$849 controller uses daughterboards called Mediadapters to configure the controller for various mass-storage devices. Currently, PSI offers two Mediadapters, one MFM (\$395) and one 2,7 RLL (\$435), each of which can control two floppy disk drives and two hard disk drives. The **hyperSTORE-816 SPU** can support a maximum of 16 physical devices.

Although it's a 16-bit card, the **hyperSTORE-816 SPU** will automatically adjust to an 8-bit data path when plugged into an XT.



The controller comes standard with a 512K on-board DRAM cache (expandable to 4MB); the board accepts either 8-bit or 9-bit parity SIMMs. It incorporates five levels of fault tolerance, including mirrored drive operation.

When placed in an 8-bit XT slot, the 16-bit controller ad-

justs the data path accordingly.

List Price: **hyperSTORE-816 SPU**, \$849. MFM Mediadapter, \$395; 2,7 RLL Mediadapter, \$435. **Requires:** DOS 3.x. Perceptice Solutions Inc., 1509 Falcom, #104, DeSoto, TX 75115; (214) 224-6774.

CIRCLE 456 ON READER SERVICE CARD

FAST MICRO ORDER LINE: 1-800-44-FAST

RGB Color Monitor by Samsung \$199



These 14" monitors were purchased from a large PC manufacturer who was overstocked. They

are brand new with one year warranties and are made by Samsung. They are fully CGA compatible and work with PC compatibles. A CGA (640 x 200 resolution) card is just \$49 and comes with a printer port. This is the perfect video combo for your new XT or AT clone.

SPECIALS WordPerfect 5.0 \$215



The most popular word processor is now even better than ever! Version 5.0 adds multiple font support, graphics integration, page preview and much more. WordPerfect 5.0 still retains its feel and ease of use that made it #1. Combine this with the best support in the industry and you can't lose.

FoxBASE+ \$185



FoxBase+ 2.10 is simply the fastest dBASE compatible database software available. FoxBase+ also adds many enhancements to the dBASE language. And it's user-friendly too, its FoxCentral uses pull-down and pop-up menus and you can perform every important database operation without programming! There are even LAN, runtime, and 386 FoxBase versions available.

PRINTERS		
	LIST	FAST
ALPS		
Allegro 24	499	315
Citizen		Call
Diconix		
150P		
Epson	499	299
Fujitsu		Call
LD3400	995	549
NEC		
P2200	569	339
P5200	999	509
P5300	1049	669
LC890	4799	Call
Okidata		
182 Plus	319	219
320	499	329
390	699	469
393	1499	949
Panasonic		
KXP1180	300	179
KXP1191	400	239
KXP1124	529	Call
KXP1595	749	419
KXP1524	949	519
KXP1450	2595	1479
Star		
NX1000	289	169
NX2400	499	299
Toshiba		
P321SL	749	459
P341SL	999	599
P351SL	1499	929

FAX MACHINES		
	LIST	FAST
Murata M1200	699	699
Murata M1600	1599	849
Toshiba 30100	1399	949

HARDWARE

BOARDS		
	LIST	FAST
AST		
Hot Shot 286	645	339
Six Pak Plus 64K	210	119
Everest		
1200B Int Modem	149	65
2400B Int Modem	249	125
EVGA	499	249
Genoa		
Super EGA H-Res+	399	179
Super VGA #5100	445	239
Super VGA #5300	499	299
Super VGA #5400	699	419
Hercules		
Graphic Card +	299	169
Intel		
8087-2	180	139
80287-10	480	249
80387-20	730	449
Above Board Plus	795	395
Orchid		
ProDesigner	499	289
ProDesigner Plus	599	389
Tiny Turbo 286	445	247
Paradise		
Autoswitch 480	399	179
VGA Plus	399	255
VGA Plus 16	499	295
VGA Professional	799	479
Practical Peripherals		
1200B Int Modem	199	149
2400B Int Modem	199	149
Prometheus		
Promodem 2400G	249	149

MONITORS		
	LIST	FAST
Magnavox		
78M749 VGA	229	149
9CM082 VGA	649	419
Mitsubishi		
1409 RGB	399	259
1410 EGA	399	339
Diamond Scan 1381	799	479
NEC		
Multisync 2a	799	669
Multisync Plus	1399	899
Princeton		
Max15	389	Call
Ultrasync	849	479
Call Ultra 16	1375	835
Seiko CM1430	995	599
Sony		
1302 Multiscan	995	659
1303 Multiscan	825	449
Zenith 1490	999	599

DISK DRIVES		
	LIST	FAST
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40MB AT #3650	499	285
Mitsubishi		
40MB AT #M353 22ms	825	399
Seagate		
20MB XT Kit #225	599	247
30MB XT Kit #238	699	267
40MB AT #251	899	329
40MB AT #251	899	389
80MB AT #4096	1199	559
Toshiba		
360K Floppy	119	69
720K 3.5" Floppy	149	69
1.2MB 5.25" Floppy	149	79
1.44MB 3.5" Floppy	189	89
Call On Non-Listed Items		

Database		
	LIST	FAST
Clipper	699	399
DataBase	600	399
dBase IV	795	439
dBXL Diamond	199	105
Fortbase Base	395	185
Fortbase Plus Lan	595	295
Paradox 3.0	725	459
RepFile	295	179
Rbase for DOS	700	439
Reflex	150	90
Q & A	349	199
Q & A Lan Pack	299	185
Quicksilver	599	329
Desktop Publishing		
Byline	295	175
GEM Desktop Pub.	299	169
Pagemaker	795	449
PFS: First Publisher	129	69
Publisher's Pantheus	285	149
Ventura	895	Call
Financial		
Bedford Assoc. Acct.	249	139
Computer Integr. BPI	Call	Call
DAC 3.0	99	59
DAC Payroll 3.0	99	59
Dollars & Sense	179	99
Managing Your Money	199	117
Peachtree Connector II	149	89
Turbo Tax 1040	75	42

SOFTWARE

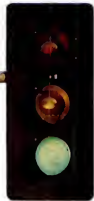
Graphics		
	LIST	FAST
Deluxe Paint II	105	67
First Graphics	129	Call
Freelance Plus	495	Call
EGM Artline	495	269
GEM Draw Plus	299	169
Generic CAD Level 3	250	149
Graph Plus	495	299
Harvard Graphics	495	Call
Perspective Jr.	149	85
First Choice	159	89
Works	149	89
Windows 286	99	59
Windows 386	195	117
Micro		
Keytronics Serial or Bus	119	75
Logitech Serial or Bus	119	65
Logitech New HiRes	139	85
Microsoft Serial or Bus	150	95
Microsoft W Windows	129	95
Omnimouse Serial	89	35
PC Mouse II Serial or Bus	149	82
Power Protection		
Curtis Ruby Plus	115	59
Datashield 85	90	57
Datashield 100	99	57

Word Processors		
	LIST	FAST
Ami	199	Call
Easy Extra	99	55
GEM First Word Plus	199	117
Grammatik III	89	49
Manuscript	495	Call
Multimate Adv. II	565	267
Professional Write	199	109
Rightwriter	95	47
Sprint	195	119
Q & A Write	199	109
Webster's Writer	60	47
Word	450	Call
Word Perfect	495	215
Word Perfect Library	129	60
WordStar Pro. 5.0	495	189
Call On Non-Listed Items		
TERMS:	Most Orders Ship Within 48 hours. No Charge for Visa or MasterCard. Shipping & handling charges \$5.00. Most Sales. Product warranties, offers & claims are handled by the manufacturer only. All returns are subject to 15% restocking fee. Call for RMA. Member. No returns on used items. Sorry, no C.O.D.'s. Personal company checks delay shipping. Compatibility not guaranteed. A/P's add \$1 per box. Price's availability subject to change. A/P's orders add \$7.95 per box for your protection. We check for stolen credit cards.	
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Turbo Debugger won *PC Magazine's* most recent Award for Technical Excellence, and here's what they said:

"Everyone who's tried the Turbo Debugger agrees. It wins the (development tool) category's award for Technical Excellence hands down. The user interface is simple yet elegant; the program works the way programmers want to work. Yet again, Borland has advanced the state of the art in an eminently useful way."

Bill Machrone, Editor-in-Chief, *PC Magazine*

Debug any size program

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- Full 386 support
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- Browse through structures with data debugging
- Set conditional breakpoints, break on memory access
- Step, run code, log expressions
- 386 ICE capabilities

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Code: MC13

BORLAND

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Change your views.

Getting 12 hours of work done in 8 with our new Turbo Debugger* is the kind of accomplishment that will instantly change your views about debuggers and debugging.

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Switching from an older debugger to our new Turbo Debugger is painless. If you're currently using another debugger or thinking about buying one, think twice.

Turbo Debugger can easily convert CodeView* programs to make your debugging easier, smoother, and a lot more efficient in every way.

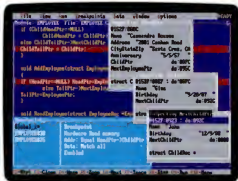
To point is the point

Point at something in Turbo Debugger and you instantly see what you want to see—and if you can see it, you can change it. Pointing is the high-tech simplification of a great deal of sophistication.

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Data debugging: An easy way to browse through your data structures.

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Bill Machrone, PC Magazine

"CodeView takes up too much room. Turbo Debugger can go into the virtual mode of the 386, taking up almost no memory."

Bruce Lynch, PC Week



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Code: MD13

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Q&A won PC Magazine's
1988 Technical Excellence Award
over all application software released
or upgraded in 1988.

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*Q&A Awards: #1 Corporate Simulation PC Week 1989, PC World's Best Buy 7/89 and World Class 9/89, Software Digest #1 File Manager 2/89, InfoWorld 9/3 rating 5/89, PC Magazine Editor's Choice 3/87 and 4/88, Technical Excellence 1/88. *OS/2 version available through disk exchange. See inside Q&A package for details. Q&A is a trademark of Symantec Corporation. © 1989 Symantec Corporation.

Now Available
For OS/2!

PC UPDATE

by Elisa J. Hirsch

Compaq Reduces Prices on 386 Machines

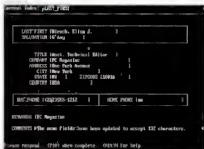
Compaq Computer Corp. announced price reductions on its **Compaq Deskpro 386** machines by 9 percent to 16 percent. Model 20 has been reduced from \$4,299 to \$3,799. Model 40 from \$4,999 to \$4,199, and Model 1 from \$3,599 to \$3,299. Compaq also announced it has published versions of MS-DOS 4.01 and MS OS/2 1.1. The new MS-DOS includes a graphical interface that incorporates menus, windows, icons, and mouse control; the COMPAQ FASTART utility; LIM EMS compatibility; and the MEM command. MS OS/2 1.1 has dual-boot capability and includes the Presentation Manager. MS-DOS 4.01 retails for \$150, MS OS/2 1.1 for \$340. Compaq Computer Corp., Houston, Tex.: (713) 370-0670.

The Logical Connection Has 1MB Version

Fifth Generation Systems announces a new **Logical Connection** that increases the internal RAM buffer to 1MB of memory. The upgraded EPROM firmware has a new buffer-management algorithm that allows several applications to run simultaneously. A new version of **POPLC**, the Logical Connection's temporary PC-switching utility, is being shipped with the 1MB Logical Connection. Both the EPROM firmware, Version 3.07, and **POPLC**, Version 2.06, are available to registered owners of 256K and 512K Logical Connections for \$85, or \$15 for **POPLC** only. New packages including the upgraded firmware retail for \$1,095. Fifth Generation Systems Inc., Baton Rouge, La.: (504) 291-7221.

PC-File:dB
Widens Memo
Fields

ButtonWare has released **PC-File:dB**, Version 1.1, which includes wider memo fields. The upgraded field can display up to 132 characters across. Version 1.1 now allows users to design



PC-File:dB
1.1 memo
fields now
allow 132
characters.

nate names for index files. Additionally, the database has redefined IF calculations and better lookup support for referencing other drives. Registered users can upgrade to Version 1.1 for \$20. New packages retail for \$89.95. ButtonWare Inc., Bellevue, Wash.; (206) 454-0479.

Macola Software 3.13 Enhances Displays

Macola has released Version 3.13 of its accounting, distribution, and manufacturing software system, *Macola Accounting Software*. The enhanced packages include easier PgUp and PgDn capabilities. General Ledger has an

[illegible]

Macola Accounting Software 3.13 has easier scrolling capabilities than previous versions.

additional reference field for vendors and customers. All of the packages include commission on cash receipts. Version 3.13 also supports 3Com networks and Novell's TTS (Transaction Tracking System). Prices for the new modules range from \$795 to \$1,595. Macola Inc., Marion, Ohio; (800) 468-0834.

Readability Plus Evaluates Style Four Ways

Scandinavian PC Systems has incorporated four statistical indexes into its style checker, **Readability Plus**. The enhanced version offers automatic translations for files written in *WordPerfect*, *WordStar*, *WordStar 2000*, and *Microsoft Word* as well as standard ASCII format. Registered *Readability* users can upgrade to *Readability Plus* for \$19.95. New packages retail for \$94.95. Scandinavian PC Systems Inc., Rockville, Md.: (301) 294-7450.

AutoSave 2.0
Reads
AutoCAD 10

AutoSave, Version 2.0, has been enhanced to include the ability to transfer files between **AutoCAD, Version 10**, and earlier releases. **AutoSave 2.0** also has an improved display, faster recovery, and new error-spotting routines. The upgrade for registered users is free. **AutoSave 2.0** retails for \$249. Cyclo International Inc., Atlanta, Ga.; (800) 336-6644.

Plus Passport Provides NetWare Compatibility

The **Plus Passport**, a LAN security system, now has drivers to support Novell's **Advanced NetWare/286**. The drivers allow the Passport to be removed and reinserted into the server without having to regenerate the operating system. A free upgrade is available to current Passport users. New packages cost from \$1,450 to \$1,550 depending on the configuration. Plus Development Corp., Milpitas, Calif.; (408) 434-6900.

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COMMUNIQUÉS

Bill Howard

Inside the Smart Home

Editor's Note: For more than 10 years, Mark Process has designed and installed custom audio, video and lighting systems in the homes of Los Angeles's rich and famous. (Clients include Barbra Streisand, Harold Robbins and Barry Manilow.) He has used his background in architectural drafting, graphic design, electronic engineering, computer programming and acoustical analysis to carve out a specialty in the emerging field of computer-driven residential electronics.

As a participant in the Electronic Industries Association Smart Home committee, Process is on the front



Outside the Smart Home, however, you'll find Lotus 1-2-3 running upside down. According to the article, the author has installed a sound system for Barry Manilow. (Home magazine, February 1989)

The Laptop Weighs Just 12 Pounds (Plus 315 Pounds For the Heat Sink)

"Of particular importance to the laptop market is the fact that the RC224AT's 305-megawatt power requirement is the lowest available to date, according to Dudley Westlake, Rockwell's modem project manager.

"The [modem] chip's unique Auto Sleep mode—under which the chip requires only 37 megawatts of power when inactive—provides further power conservation, he said."

—PC Week, March 27, 1989

PC Dictionary: MFM

"The Western Digital WD1002-WX1 Controller is a 5-1/4" and 3-1/2" Winchester (fixed) disk controller for IBM-compatible personal computers. It uses the Media Fault Method encoding with 17 sectors-per-track."

—PC's Limited "Hard-Drive Product User's Guide" (MFM stands for modified frequency modulation.)

Mea Culpa

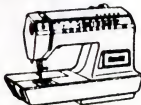
"Another idea that may sound even more speculative could prove to be the most valuable one of all—the development of ways to represent information as sound!"

—William F. Zachmann, PC Magazine, March 28, 1989. Readers noted this concept is sometimes called "speech."

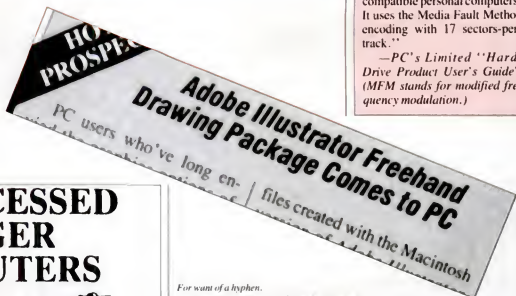
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While They Last



We could be wrong, but we think it's not a computer. (York, Pa., Daily Record, January 19, 1989)

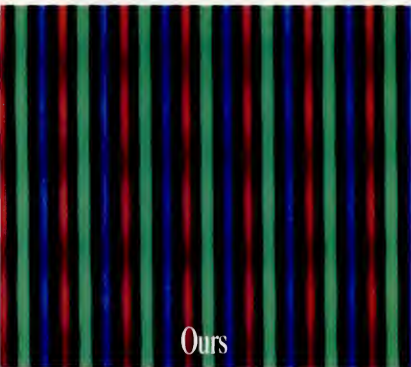


For want of a hyphen, Adobe makes Illustrator, Aldus makes Freehand, and both made the first line of our headline in the March 14, 1989, issue.

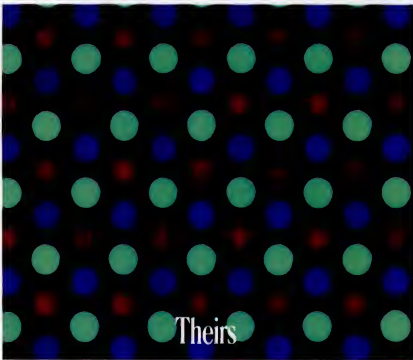
Have you seen anything offbeat about the computer industry? Send submissions to Communiqué's, PC Magazine, One Park Avenue, New York, NY 10016. Don't make marks on submissions. Contributors receive \$50 and a PC Magazine T-shirt.

Winners this issue include: Gerald Zucker (Media Fault Method), Pam Trebon (Illustrator Freehand), James A. Lewis (Smart Home), Stephen A. Risik (Singer computer).

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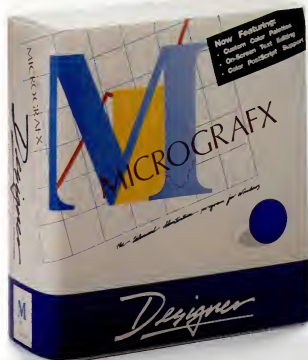
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■ BILL MACHRONE

SIGNS OF THE NINETIES



With a toddler at the AT, a daughter at the XT, and a wife waiting for his laptop and modem, Machrone's idea of some help around the house is a network manager.

WANTED: Person to do LAN administration and light house-keeping. Must be good with children and print queuing. References required.

I haven't seen that particular ad in the "help wanted" section yet, but it's bound to happen. I've already seen the need emerging in my own household. The den houses a 12-MHz PC's Limited 286 machine, an old XT-compatible Compaq Plus, an HP LaserJet, an old 80-column Centronics printer for IBM graphics, and an Okimate 20 for color.

On a typical evening, Andrew, my 4-year-old, is on the 286, playing *Sesame Street: Opposites Attract*, one of Polarware's Electric Crayon learning games. Stephanie, who's 7 years old, is at the Compaq, playing Designware's *Math Maze*, which won't run on the big machine because its ancient ROMs and 12-MHz bus speed befuddle most copy-protection schemes. I've got the NEC UltraLite on my lap, and my wife, Sharon, is waiting to use it to update the Brownies' activities calendar. She also has a draft of a letter that she wants to fax to her boss via MCI Mail.

Andrew has just colored a picture of Prairie Sue and Little Bird holding a rainbow array of balloons. He wants a hard copy, but the dot matrix printer is attached to the other machine. Stephanie would love to print her stuff out on the LaserJet, but it's connected to the PC's Limited. I've got a phone line plugged into the back of the UltraLite and have just received some MCI Mail that I'll need in hard copy. No

dice. I don't have—and don't even want—the printer adapter for the UltraLite. It's part of the floppy disk interface, and floppies are utterly superfluous on a machine that comes with a 2MB RAMdisk and Lap-Link built into ROM. But I can't link to anything at the moment. And Sharon is still waiting for a machine.

THE PERFECT NANNY Now would be the perfect time for a computer-literate Mary Poppins to breeze into our lives with a 386 in her satchel and a reel of twisted-pair cable instead of her umbrella. A proper LAN nanny would realize immediately that four users packed into one suburban den is unthinkable. Straight off, she'd run cable to the kids' rooms, the basement, the library. She'd set up the 386 as a nondedicated file server, install a small, slick operating system like *LANtastic*, and square away our printer sharing. And we'd want a CD-ROM player on the file server, such as

the half-height internal NEC unit. With the increasing number of desirable CD-ROM databases, I'd hope that one drive would be enough. Our LAN nanny would know.

Our modern Ms. Poppins would survey the guest bedroom, noting that it needs both a phone line and LAN services. When some of our high-tech associates come to visit, they'll want to check their MCI Mail in privacy, rather than having my kids pester them about why they still use that crummy old laptop with no backlighting and the 720K floppies.

She'd also know that some of our guests can wreak havoc on the business of the home. John Dvorak, for instance, has only two flaws: a congenital weakness for cheap knockoff watches and a need to consume phone lines. As soon as he shows up in a room he finds an empty RJ-11 socket, he plugs in his laptop, and his modem dials some obscure bulletin board on the other side of the world. Meanwhile, he's commandeered the nearest telephone:

"Hey. It's Dvorak. Yeah. Yeah. Oh, really?! Hah. I told you that would happen. Nope. Yeah. OK, gotta run. Bye." When you ask him what that was all about, he smiles and says, "Wait for my next column."

If our LAN nanny can offer guests like him spelling checkers, modem pooling, a variety of e-mail services, and printed output—without disrupting Stephanie's homework—we're all ahead of the game. Dvorak might even file his column earlier.

DIVERSE DIFFERENCE There's actually little difference between my fam-



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CIRCLE 140 ON READER SERVICE CARD

■ BILL MACHRONE

ity's home computational needs and those of a small business. Both are markedly different from the needs of a workgroup in a large- or medium-sized business. The difference is diversity. Small businesses are often one-person-per-function. Workgroups tend to have multiple people performing one function. Multiple simultaneous access to data is key in most workgroup settings, while device sharing is the lifeblood of small LANs.

The conventional wisdom is that you don't buy LANs anymore for device sharing. Laser printers, hard disks, and modems are inexpensive enough that you just give them to the people who need them. But there's no way I'm going to spring for two more laser printers for my kids. And there's no way the owner of a small business is going to buy an additional laser for a clerk who has a legitimate need for a PC yet only puts out two or three letters a day.

Size and complexity make a big difference in the cost of a LAN, too. The fully loaded cost in medium- and large-sized networks can exceed \$2,000 per seat, not counting the cost of the PC and its software. With most small LANs, the goal is to be up and running for under \$500 per seat. That usually entails nondedicated file servers, peer-to-peer facilities, and slower wiring schemes. It means scrimping by using whatever e-mail facilities come with the network rather than a full-featured aftermarket package like *ccMail*.

While I'm sure that even the smallest offices would avail themselves of e-mail, I've had the vaguely uneasy feeling that leaving e-mail messages for one another would somehow cut at the heart of the nuclear family. But I got to thinking about how I leave messages on the home answering machine as I travel all over the country, assuring Sharon that I've arrived safely. Then it struck me: the home LAN is really a substitute for the notes stuck to the refrigerator with flower-shaped magnets. I could remind Stephanie to do her homework. She could remind me to clean her fish tank. (Dads get all the good jobs.) Andrew could impress me with his latest conquests as he learns to spell. I'd look forward to getting messages reading "Andrew andrew stop sears school bus andrew."

Somewhat, I think even the original Mary Poppins would approve.

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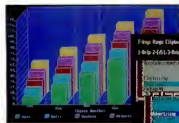
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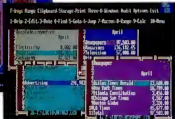
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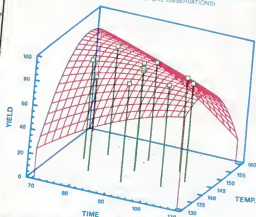
MODEL FITTING RESULTS FOR YIELD

INDEPENDENT VARIABLE	COEFFICIENT	STD	ERROR	T-VALUE	SIG LEVEL
CONSTANT	-50.77	847505	747	0.02209	0.976
time	17.822499	3	288084	0.00158	0.988
time^2	-0.014490	0	0.14553	-0.8508	0.400
temp	44.807002	0	0.02458	-3.8200	0.000
temp^2	-0.184001	0	0.00287	-4.8037	0.000
time*temp	0.000000	0	0.00000	0.00000	0.999

FURTHER ANOVA FOR VARIABLES IN THE ORDER

SOURCE	SUM OF SQUARES	DF	MEAN SQ
time	15.3869908	1	15.3869908
time^2	10.6011411	1	10.6011411
temp	1.0780687	1	1.0780687
temp^2	80.4298661	1	80.4298661
time*temp	98.0625000	1	98.0625000
Model	167.558209	5	

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■ JOHN C. DVORAK

CRAZY MISTAKES, PART 2



In "Crazy Mistakes, Part 1," Dvorak shared his favorite stories of computer bloopers. In this sequel, he's letting readers tell their own tales from the silly side.

My favorite customer misunderstanding happened 3 years ago when I was in customer support. A female customer called, asking why the computer could not read her disks. Quickly realizing that they were not formatted, I told her, "OK, put a clean disk in the floppy drive and type **FORMAT a:**." She told me to wait, put the phone down, and a bit later came back and said that the problem was worse—not only could the drive not read the disk but it sounded terrible. When I asked her to walk me through the steps, she told me she took a disk out of the box, washed it . . . I had to replace the whole damned disk drive.—Tony McNamara

The crazy mistakes sweepstakes continues, with stories that make me stop and wonder who is at fault (See "Crazy Mistakes, Part 1," *PC Magazine*, March 28, 1989). Is it because the documentation is poorly written, or do instructions simply presuppose too much? Perhaps the language itself is to blame.

The classic misconception anecdote is epitomized by Ross Greenberg's true story about a customer who couldn't get Ross's program to work—and complained that he had to trim Ross's 5¼-inch disk with scissors to get it to fit into the 3½-inch slot of his Model 70!

Jim Button and others report that customers complain constantly about how the color options of certain programs don't work. Of course, these customers have monochrome displays.

Dozens of support technicians tell me that user after user calls to ask where the

"ANY" key is. After all, the program says "press ANY key," doesn't it?

Let's not forget the story about the young student who was having trouble with her floppy disk. When the teacher asked to see it, she pulled the neatly folded disk out of her pocket! Then there's the story from Lee Hausman about a woman who, when told to insert disk number two, did it without removing disk number one! After all, the instructions never said to.

Harry Joel sent me a disk to prove what a student of his had done when told to erase the disk. He took an eraser to the oxide!!

Then there are plain odd stories such as the one from Panama's lone BBS sysop, Steve Burrill, who wrote a program that assists users in figuring out their maids' wages based on Panamanian Labor Laws:

I released it as shareware. Five dollars would allow them to use the share version, and \$20 would let them have the whole

program. Some user called the BBS and downloaded the file, then simply logged off. Later that evening, the user left a comment to me saying he thought the program was free to use, and when he read the .DOC file, he discovered the \$5 registration fee and then wanted to return the program to me. So the user uploaded the file back to me to terminate his obligation! It did not end there . . . He overwrote my downloadable file with the same name, but only after he had used the program, registering his name and personal financial status. For a week his business was well known to all who downloaded this file!

Then there's the consultant who advised his customer not to buy a standby power supply because "if you buy a quality machine for your network server, its power supply 'evens out' all power fluctuations, spikes, and surges."

Finally there's Barry Vinson's story:

When I visited a large oil company, a customer of ours was explaining a new computer program that was designed to keep track of daily drilling costs. He started the program on his IBM Model 80, and as I sat there waiting for it to load, I remarked, "It sure takes it a long time to load." He replied, "Yeah, it's a huge program. It takes 18 megabytes of memory to run." I replied, "That's interesting. What language is this program written in?" He answered confidently, "It's written in ASCII!"

As you laugh, remember: We're all in this together!



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■ JOHN C. DVORAK

INSIDE TRACK

What price glory? Hacking a name for yourself.

Shades of Steve Jobs Dept.: Insiders tell me that the members of the design team of the Intel 486 have literally carved their individual initials into the substrata of the chip itself. This reminds me of the signatures you'll find inside the case of an old Macintosh. The kicker in the Intel situation is that the designers made the initials all part of working circuits, so they **can't be removed** by some killjoy. Get out your electron microscopes to get a view of this. I'd be amused if these guys' initials showed up on a NEC chip!

Keeping Up with Telecommunications Dept.: Are you sick of using Xmodem for data transfers? If you use Xmodem, you are at least 5 years behind the times. Long ago, you should have switched to Ymodem, and a couple of years ago, you should have switched to Zmodem. If you don't use Zmodem, start. If you have *ProComm* or *Qmodem*, you can easily patch Zmodem into the system with a simple utility available on most BBSs. The popular Telix already implements Zmodem.

Here's the simple fact: Zmodem is the state-of-the-art protocol for microcomputers. It's the protocol of choice. **Forget the old dogs.** It's fast and bullet-proof. If you're knocked off-line, it will continue the file transfer from where it left off. Enough said. Call the protocol guru (and Zmodem designer) Chuck Foresberg at Omen Technology (Box 4681, Portland, OR 97231; (503) 621-3406; BBS, (503) 621-3746) to get the Zmodem patch or to buy his popular \$139 comm package, *Professional YAM*.

Telecommunications Dept., Part 2: Since I've adequately plugged Zmodem, you also might be interested in a hot brand-new protocol called bimodem. This baby lets you upload and

download at the same time! It has line checking, variable-size block transfers, and crash recovery. John Erickson, down from the world of minicomputers, has decided to join the microworld with this hot item. It was designed to maximize efficiency on BBSs where session times are limited. Try him at his **Valley of the Sun BBS** ((602) 979-5720) or at his office ((602) 942-5403) if you need this money-saving capability. You businesspeople who make **expensive modem calls** should check this stuff out.

Reader Mike Fahy Tells a Tale Dept.: "I watched TV (ESPN) for a little while tonight as Harvard's hockey team played somebody for the NCAA championship. Harvard's coach is Bill Cleary, who was their big star in 1956, my senior year at Yale. We beat them that year at the New Haven Arena, 1-0. The only goal of the game was scored by a classmate of mine, a rather slow but aggressive forward by the name of John Akers. That's right, John Akers, today the C.E.O. of IBM."

This anecdote explains something, but for the life of me, I can't figure out what. **Readers: any ideas?** I figure the anecdote was given me because Yalies love to brag about beating Harvard, even if it was 33 years ago. Mentioning Akers was just a trick.

While on the Subject of Tricks Dept.: A new game from our friends at Broderbund may have the world's greatest "BOSS" key. It throws a realistic spreadsheet onto the screen. Once you're in the "boss is watching" spreadsheet mode, you can then pick a variety of time-killing diversions including a fascinating user-controllable spinning logo. **Weird.** They should win some sort of award. The game is *Star Wars* and it's modeled after the arcade

game. User interface jockeys should collect this one for sure.

Fax Follies Dept.: I received a chain fax the other day. Apparently if I scan in \$100 and fax it to three people listed at the bottom of the letter, I'll be on the bottom of the next letter and make from \$10,000 to \$100,000 all conveniently faxed to me. Think about it.

Reader Joseph Plett writes to tell me about a fax, sent over a weekend, that **chewed up** all the paper in the thing. I thought it was a good reason to recommend fax cards for the PC. Nope. Funny thing happened to me when my hard disk filled up from **fax overload** and caused all sorts of havoc. You can't win.

Meanwhile, what we don't need is legislation that makes the **junk fax illegal**. One man's junk fax is another's important information. Fight these laws.

While on the Subject of Legislation Dept.: I see that one of the Ziff-Davis publications, *Computer Shopper*, is taking steps to inform the public about **legislation pending before congress** that would allow states to tax all mail-order goods shipped from out of state into your state. How they expect to enforce this nonsense is beyond me. The proposed law is a clear violation of state sovereignties. Why should a vendor in Texas have to pay taxes to California when the vendor in Texas receives no goods and no services from California? **What's the point?** To punish the Californian for buying out of state, that's the point. This is simply interstate import tariffs (duty) in disguise. Since computers can be big ticket items, the tax people see it as something to tax. The heck with the historic preservation of duty-free trade between states. **Write your congressman today** and tell him you don't want him voting for the use tax on mail-order purchases. If you don't act now, this will cost us all a lot of money.

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With another hot key you decide to look in on Sue's computer screen. She's new and you need to keep an eye on her work. You see that she is working on a letter using a word-processor. You monitor her for awhile without interfering with her work. In fact, Sue doesn't even know you're there!

Hot key again and off you go on your rounds of the company. Viewing one screen after another, helping some, watching others. All from the comfort of your chair. Finished, you hot key back to your spreadsheet and carry on with your budget. Amazed, you think that support has never been this easy before.

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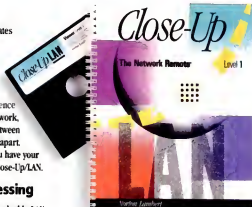
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■ JIM SEYMOUR

PCS AND THE FAX CULTURE



PC fax cards can't replace the fax machine, but they can supplement it. They offer more privacy, letting you request a favorite song on the radio—without tuning in your secretary.

These days, when we're running low on eggs and bread, I don't make a trip to the grocery store. I fax a shopping list to Simon David, the store we use, and a couple of hours later, a nice young man in a minivan drives up with our groceries.

To be sure, that's not how most people shop for groceries—and I'll admit that Simon David isn't a typical grocery store—but it's a harbinger of things to come for many of us. Today, delis take orders for pastrami sandwiches by fax. Radio stations invite listeners to fax in their requests on special lines. PC direct marketers encourage customers to bypass busy 800 lines by faxing their orders.

There's a dark side to this fax boom, too, of course: junk fax. Some outfits have taken to advertising in *The Wall Street Journal*, rewarding office workers with tote bags and sometimes cash in exchange for lists of all the fax numbers the office machine has communicated with on a given day. They're gathering fax numbers to sell to direct marketers, who are beginning to flood our fax machines with handouts that will offer everything from discontinued luggage to, probably, Ginsu knives and Mr. Microphone. Junk fax threatens to swamp many offices' fax machines, so now the trick is to conceal your fax number; don't spread it around.

In short, communication by fax has become commonplace, driven by the under-\$1,000 prices of low-end fax machines, by the escalating cost of overnight courier services and, of course, by our impatience and our love of electronic gadgetry.

Why write about the fax phenomenon in a computer magazine? Because fax cards installed in PCs are adding dramatically to fax traffic and becoming very important parts of the overall fax picture.

In the past, I've written that I don't think fax cards are a substitute for the real thing. In other words, if you really need a fax machine, you really need a fax machine. Trying to use a PC fax setup as a replacement for a standard fax machine means you'll have to buy a scanner and go through a lengthy, clumsy drill every time you want to scan a page and send it by fax.

But the PC fax cards and software we have today let us send quick and not-so-dirty PC faxes with ease and convenience—with such ease and convenience, in fact, that PC fax cards have become valid extensions of, though not replacements for, standard fax machines. As such, they can be extremely important productivity tools. That add-on aspect of PC faxing has

been confirmed in every office in which I've studied the use of fax cards. These cards are rarely used as replacements for standalone fax machines—except in very small businesses. Instead, they represent a whole new layer of fax utilization—incremental additional fax volume, to speak B-school lingo for a minute.

WHY USE A PC FAX CARD? Beyond the pop-up convenience of casual faxing, fax cards offer special advantages in two other areas. If you're not using PC fax now, consider whether these advantages might be welcome in your office.

First, PC fax cards excel at multipoint distribution of fax messages. With most fax machines, sending the same message to 10 or 20 or 50 addressees means a long, tedious session at the fax machine, as you endlessly toss the same pages into the feed bin and endlessly redial for each fax number on your list.

(Of course, now that we're in the Group III fax age, you can buy fancy, high-volume fax machines, with attached hard disks, that digitize and store your message and your distribution list for unattended multipoint distribution. But those monsters are rare, indeed, because they're awfully expensive and not a very good deal unless you use that capability frequently.)

But PC fax cards and PC fax software make that process incredibly fast and easy: they simply look up each successive addressee on a list you create, then dial and transmit the message. And they'll do it all in the background, if you wish, while you go on to other work. If that doesn't sound



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■ JIM SEYMOUR

good to you, ask your secretary how it sounds: after all, isn't he or she the one you send to stand in line down at the fax machine...?

The second big advantage of PC fax cards is confidentiality. I can't count the number of times someone has come into my office with an incoming fax for me that goes into detail on a confidential project. Who else, I often wonder, has read that message since it came in? In most offices, incoming faxes are distributed once or twice a day, usually by mail clerks or secretaries, after those faxes have piled up in

■ PC fax cards and software make multipoint distribution of fax messages fast and easy. And they'll do it all in the background, while you go on to other work.

the machine's output tray. Meanwhile, people who are expecting specific incoming faxes have been wandering down to the machine from time to time, pawing through and reading the accumulated messages, looking for theirs. This means sensitive incoming faxes are often read by a long list of people for whom they were never intended.

By contrast, faxes coming into PC fax cards are usually seen only by the person to whom they're addressed, as he or she works at the PC. That isn't what the Pentagon would call high security, but it's a lot better than the kind of confidentiality found in most fax machine-to-fax machine transmissions.

If you've dismissed PC fax cards as gadgets that wouldn't be useful in your office because you already have a fax machine, think again. They offer real advantages over standard fax systems—as long as you don't expect them to replace those systems.

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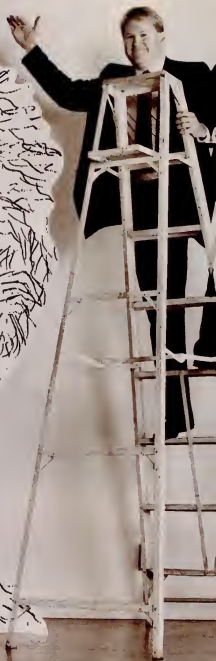
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■ WILLIAM F. ZACHMANN

IN SEARCH OF THE KILLER APP



Despite lots of digging, nobody's managed to unearth the next Lotus 1-2-3. But maybe we've been looking in all the wrong places. Game software may prove a fertile breeding ground.

Looking for the next killer application seems to be the PC industry's equivalent of the search for the Loch Ness monster. Lots of folks are convinced that it's out there somewhere, but nobody seems able to find it.

The list of candidates touted by one analyst or another is long and expanding. Artificial intelligence applications, expert systems, groupware, personal information managers, presentation graphics, hypertext programs, object-oriented database managers—all have been heralded as the next great new category of software by somebody or other over the past few years.

REALITY VS. RHETORIC Reality, however, has come nowhere near to matching the rhetoric. All this stuff put together isn't much more than a spit in the ocean as far as software use goes. The traditional categories of spreadsheet, word processing, database management, graphics, and communications programs still account for well over two-thirds of all software sales. By the time we add other long-established categories such as utilities, languages and tools, games, and educational software, there's very little market share left over for the newer ones.

DTP IN WP Only desktop publishing (which, according to the Software Publishers' Association, generated just over 8 percent of DOS and nearly 14 percent of Macintosh software sales in 1988) might reasonably be claimed as a new category with significant market share. Even that is disputable, however. More and more,

desktop publishing capabilities are being built into word processing software. Rather than emerging as an entirely new product category, desktop publishing is for the most part being absorbed into traditional word processing packages, appearing in new releases as an added feature.

None of the other would-be killer apps has proven anything more than a niche product in the marketplace. So far, the search for "the next Lotus 1-2-3" has yielded results that are no more concrete than the fruits of the Loch Ness monster search.

That this core of applications has such a firm hold on us suggests to me that the lack of software for OS/2 isn't likely to be nearly as inhibiting to its acceptance as many seem to think. The continued dominance of traditional software categories tells us that radically new applications aren't needed to get started with OS/2. On the contrary, all you need is a set of good products

in the traditional categories (spreadsheet, word processor, graphics, database, and communications programs, plus tools and utilities) that take advantage of Presentation Manager graphics and the additional capabilities of OS/2 effectively. OS/2 use should be growing strong by year-end—even without the emergence of any new "killer apps."

Just because no enormously successful new sort of software has yet appeared does not necessarily mean there won't be any. The next new application genre may take longer to emerge, and it may be of a much different sort than has generally been suggested. It may also involve a more significant qualitative shift than currently anticipated.

My own view is that it will still be 2 or 3 years before a significant new-and-different software category emerges. When it does, I suspect that it won't be business productivity software at all. I think it will come in the form of products that entertain while teaching something objectively useful by simulating experience.

Increasingly powerful systems—systems that have high-resolution graphics and are capable not only of storing and displaying but also of creating and manipulating images and sound—will make it possible to create simulated environments with stunning realism by the early 1990s. These, in turn, will enable the development of learning environments unprecedented in human experience.

Even a simple text-based game like *Adventure* or *Zork* has remarkable similarities to learning experiences in real life. As a



■ WILLIAM F. ZACHMANN

player, one has to learn one's way around, mastering the demands of a new environment and discovering what works and what doesn't in the pursuit of objectives. If you think about it, that isn't much different

from adjusting to school or to a new job.

Of course, a lot of the learning that takes place in one of these computer games is specific to the game itself and doesn't transfer very well to situations in the real

world. Learning how to make a crystal bridge appear across an underground chasm in a game doesn't have much practical application.

EDUCATION BY SIMULATION Still, there isn't any reason why computer-generated experiences can't be used to learn and practice real-world knowledge and skills as well. That's already being done with simulators for airplanes, spacecraft, and ships.

In fact, there is already a wide range of PC software that demonstrates the possibilities for creating entertaining learning experiences. Microsoft's *Flight Simulator* and a host of newer flight-simulator programs are instances. Others include Accolade's *Grand Prix Circuit* and *The Duel* (in which you can enter a Grand Prix race or

■ Of course, learning how to make a crystal bridge appear in a game doesn't have much practical use.

drive a fast sports car through California, for example), Sierra On-Line's games like *Police Quest 2*, *Leisure Suit Larry*, or *King's Quest IV*, and Spectrum Holobyte's *PT-109*. Although these are games, they all demonstrate how well even present systems can be used to create simulated environments with remarkable realism. In effect, they are simply prototypes of the sort of software that more-powerful and more-capable systems will make possible in the future.

By taking advantage of increasingly powerful hardware to create even more realistic environments, we will be able to design more-serious learning experiences through simulation. With any luck, ultra-fast microprocessors, optical disk storage, image processors, digital signal processors, voice and sound generators, and high-resolution graphics will combine to make it possible to use computers in ways significantly, qualitatively different from anything that has been done before. □

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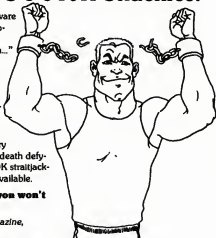
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CIRCLE 336 ON READER SERVICE CARD

■ STEPHEN MANES

MR. COMPUTER, TAKE A LETTER- PLEASE!



Forms processing packages are hot, but form-letter programs have never really managed to catch on. Manes thinks it's because until now, they haven't quite hit us where we live.

Business forms software is one of the hottest new product categories around, as the feature "Forms Software Fills in the Blanks," in this issue, attests. Fine new programs let any modern-day Huck Finn with access to a laser printer and scanner create signed copies of your company's purchase order and open a personal loading dock. Clever dBASE mavens can buy mailing lists to automate the process. It's what the Chinese used to call a great leap forward.

Yet a similar product remains in the shadows: form-letter software. Every year or so, some bright entrepreneur comes up with dozens of prewritten letter forms, lets you hook them into your mail-merge program, and eliminates the drudgery of having minimum-wage drones try to produce snappy, grammatically correct correspondence. Every year or so, the world yawns.

Not even Microsoft has been able to waken this market. Although the tens of users of its *Bookshelf* product have access to a plethora of prewritten missives, there is no record of anyone but Bill Gates ever having used them.

Why? Because they're too general, that's why. Here's some of what you get on the *Microsoft Bookshelf* disk:

- Follow-up after presentation
- General response to inquiry
- Letter of introduction
- Letter requesting a sales interview
- Request for references
- Salesperson motivation letter
- Welcome to new employee

I mean, give me a break: anyone with a scintilla of intelligence can produce gener-

al business letters easily without recourse to prewritten forms. My fresh-from-high-school secretary used to bang 'em out in minutes with just the right balance of formality and folksiness:

Dear Customer:

Thank you so much for your wonderful request for our wonderful catalog. I put it in this envelope with a whole lot of wonderful coupons. We think our prices are wonderful.

If you have any questions, please don't call collect.

Have a wonderful day!

REAL DIRECT MAIL Clearly, then, it's a case of missed opportunity. The problem isn't general letters; the problem is industry-specific letters, missives on topics the clerical and temporary help simply can't be expected to understand. That's why Dee Murre of Murresoft has introduced her first vertical-market application,

Computer Correspondence. It offers forms for our real world:

- Announcement of earnings decline
- Apology for late payment
- Explanation of CEO's stock sale
- Industry analyst's correction
- Notice of decrease in support hours
- Programmer's motivation letter
- Technical writer's excuse note

Now, that's more like it!

For example, what secretary could come up with this pointed "Determination of compatibility" letter?

Dear Customer:

In response to your question about a possible incompatibility between [product X] and one of our fine products, we refer you to any of our dealers in your area. As our authorized representatives, they will quickly and easily service your needs. Please have a major credit card number ready when you call.

Murresoft's "Delay in availability of new product" letter, a classic of the genre, will eventually come in handy at every company:

Dear Customer:

Although we announced that the new version of our product would be available early in [month and year], circumstances beyond our control have forced us to postpone the product's release until [month and year plus two or indefinitely].

We are sorry if our premature elation has inconvenienced you. We are sure you would prefer a tested, bug-free product to the slapdash, jury-rigged junk that imitators have attempted to foist off on gullible, impatient souls.



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SILENCER 150 \$129

Ultra-Quiet Reduce stress and increase productivity with the Silencer 150. Its large, low speed, West German fan keeps your system 5° to 15° cooler and 84% quieter! Great in the executive suite or home office.

TURBO-COOL 150 \$149

High Performance Upgrade your PC/XT with our popular, UL approved Turbo-Cool 150. Its patented twin fan design keeps your system 25° to 40° cooler and 50% quieter. Your PC lasts up to three times longer! Meets the demands of today's fully loaded systems.

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Maximum Performance Put AT power and 200% more cooling under the hood of your PC/XT with our UL approved Turbo-Cool 200. Its twin fans keep your system 30° to 45° cooler with no additional noise. Perfect for hot rod PCs and Mini ATs!



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*PC/Computing
January, 1989*

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DATABASES FOR



The earliest OS/2 applications include three of the most powerful databases money can buy: Paradox OS/2, Q&A OS/2, and R:BASE for OS/2. All three promise to increase your productivity, but is that reason enough for you to switch to OS/2?

You've heard it all before: OS/2 allows you to run more than one application at a time; no one will use OS/2 until applications arrive that take advantage of its multitasking capabilities; as yet, only a small number of developers have readied OS/2 applications.

But things are changing—slowly, and in significant ways.

Today, three powerful database management systems that run under OS/2—Borland International's *Paradox OS/2*, Symantec Corp.'s *Q&A OS/2*, and Mi-



THE FIRST WAVE

corrim's *R:BASE* for OS/2—are available, each with numerous features for manipulating data, including an easy-to-use interface, a programming language and/or macro facility, and robust report-writing services. Although three programs do not a product category make, it is significant that the effectiveness of the DOS versions of these applications is pretty well known: two of them, *Paradox* and *R:base* for DOS, were among *PC Magazine*'s Editor's Choices in last year's Project Database (see *PC Magazine*, May 17, 1988).

That the DBMS (database management system) market leaders have made the commitment to OS/2 early on bodes well for the establishment of the product category. In fact, OS/2 versions of other important DBMS programs, like *Informix-SQL*, *SQL*, *Oracle*, *Ingres*, and *dBASE IV*, are now available or should be released shortly, with Presentation Manager (PM) versions of *DataEase*, *Omnis Quartz*,

■ OS/2 DATABASES

SQLBase, and FoxBase due late this year or early next year.

After contacting more than 60 vendors listed in the IBM "OS/2 Applications Guide," we found that only a handful of those who had planned to release OS/2 products by the first quarter of 1989 had done so. A few more confirmed that their products would be available later this year. Other vendors have decided to forgo releasing OS/2 character-mode versions of their applications in favor of PM versions, which will delay the OS/2 editions considerably.

Among the nondatabase products for OS/2 that are available or are about to be released as of this writing are accounting packages from Platinum Technology and Open Systems and OS/2 versions of *Enable*, *Chip-Chat*, *HyperAccess*, *Professional-YAM*, *Guru*, *DisplayWrite*, *Microsoft Word*, *WordPerfect*, and *Crystal*. PM versions of *Crystal*, *SuperProject*, and *PC Paintbrush* should be ready before the end of the year. And, of course, Borland's *SideKick for the Presentation Manager* is already available.

Even with all this activity outside the database arena, it is significant that databases, rather than another mainstream application group, are the first OS/2 products to appear, suggesting that the productivity gains that are offered by an OS/2 database might provide the first real incentive for users to switch to that operating system. In this article, we'll look at whether the performance and effectiveness of *Paradox OS/2*, *Q&A OS/2*, and *R:BASE for OS/2* add up to a good reason to make the move to OS/2, consider what it is that makes an application an OS/2 application, and discuss whether OS/2 can really yield greater productivity gains than DOS. We'll also raise—and try to answer—one more question: based on your choice of a database management system, should you move to OS/2 today?

OS/2 IS PRODUCTIVITY So what is OS/2 good for, anyway? The answer can be stated in one word: multitasking. Under OS/2, you can run more than one program at the same time. Each program runs uninterrupted, regardless of whether it is in the

foreground or background (or whether or not it is displayed on your screen). You don't have to exit from one program to run another, and you can switch between programs at will. Under OS/2, there is no such thing as a DOS-style terminate-and-stay-resident program: every program continues to run in its own session until you choose to terminate it.

OS/2's multitasking capability allows you to more effectively manage your time and how you use your computer. Consider the following scenario, typical of how you would use OS/2: You need to generate a lengthy report with your database manager; you bring up your DBMS, start the report, and put that session or window in the background. Then you turn your attention to a memo you're writing with your word processing program (remember, your database manager is still running the report). Then a coworker comes in and asks for a copy of a document on a disk. You start a new session (or open a PM window) to use the OS/2 command line and copy the document to the disk (just like DOS). But your coworker forgot to format the disk. So you

WILL THE REAL OS/2 APPLICATIONS PLEASE STAND UP

Some programs are said to "run under OS/2"; others are "OS/2-compatible." Both terms may, in fact, be misleading.

Since OS/2 was first announced, a great deal of misinformation has circulated regarding what constitutes an OS/2 application. We've heard claims that a program "runs under OS/2" or is "OS/2-compatible" when it is not an OS/2 application at all. Part of this confusion centers around the different operating modes that DOS and OS/2 use.

PC-DOS and MS-DOS run in what's known as *real mode*. This mode of operation is supported by the entire Intel family of processors, beginning with the 8086. A program running on the 8086 can address any memory location within its 1MB address space, or all real memory locations. This is just fine for single-tasking, but it can be problematic for multitasking, since any program can potentially interfere with the memory used

by another. DOS programs use this mode of operation.

OS/2 runs in *protected mode*, which is supported by the 80286 and 80386 processors (and Intel has pledged protected-mode support for as-yet-unannounced CPUs). This mode allows a processor to address as much as 16MB of physical RAM and 1 gigabyte of virtual memory. In addition, protected mode allows programs to have different privileges and includes services that facilitate multitasking. In protected mode, the processor can prevent one program from accidentally interfering with another. OS/2 applications run in protected mode.

As a convenience, OS/2 offers a facility that runs real-mode software and that looks and behaves like MS-DOS. This is the OS/2 real-mode compatibility envi-

ronment, also known as the "compatibility box" or "3xBox" (since the DOS it runs is compatible with DOS 3.x). It's been called, derogatorily, the "penalty box," since it runs a program only when it's displayed on your screen (as opposed to running programs in the background). Furthermore, some DOS programs don't run in this environment at all. These are "ill-behaved" DOS programs, like some TSR or "terminate-and-stay-resident" programs, that modify the operating environment.

Thus, some vendors have claimed that their programs run under OS/2, when in fact they run only in the compatibility box. These applications are not OS/2 programs; they are DOS programs that happen to run in the OS/2 real-mode environment.

start the format program in the window and turn your attention back to the memo (now you are simultaneously running your DBMS to print the report and formatting a disk in two different background tasks). Then you realize you need to include some figures from a worksheet, which, of course, needs recalculating—after you download an update from the company mainframe. You start the download in another window and bring up the spreadsheet in yet another. You instruct the spreadsheet program to update the worksheet as the new data comes in (while you format the disk, download the new figures, and run the report).

With OS/2, mundane tasks like formatting disks or generating reports won't tie up the computer the way they do a single-tasking DOS machine. In addition, OS/2 places a higher priority on the program running in the foreground session or active window. A well-behaved OS/2 program will use only as much CPU time as it needs, allowing background processes to run smoothly. An ill-behaved foreground program will steal too much processor

time from background processes. But the speed of any one OS/2 program is less critical, since you can perform work in a parallel instead of a serial fashion. Under DOS, speed is absolutely critical, since you can't start a second job until the first

Externally and internally, the OS/2 databases are very close to being pure ports of their DOS counterparts.

has been completed. The idea behind OS/2 is to improve your work throughput, since the total time required to complete all of the tasks in parallel will be much less than would normally be needed to com-

plete them if they were done serially.

Under OS/2, you can run more than one copy of the same program simultaneously. For instance, suppose you need to query a database while your DBMS is printing a report. Just bring up the DBMS in another window and run the query there. Under OS/2, the first copy of a program's code is reused by other "instances" of the program. OS/2 won't reload a program that's already running; it just uses the code that's in RAM. This saves time and memory.

Every OS/2 program allows you to run more than one instance of itself simultaneously. Some OS/2 programs inaccurately promote this facility as a program feature; it is an intrinsic part of OS/2.

OS/2 allows programs to share the computer's resources (memory, disk, files, printer port, screen, and keyboard) with other programs. But it's up to the application program to use this capability of OS/2 effectively. For example, it's critical that DBMSs make it as convenient and error-free as possible to share databases, tables, and records. If a DBMS doesn't correctly implement file and record locking, it

Some OS/2 applications are written to run under both OS/2 and DOS. These are called *family applications*. Family applications were a big deal when OS/2 was first announced 2 years ago, since they allowed an upgrade path for applications that would run in both the OS/2 and DOS environments. With the exception of some programmers' utilities, however, only a few family applications have appeared.

Family applications are bigger than conventional programs, since they must contain machine code to operate under both DOS and OS/2. It's almost impossible to write a family application that can take advantage of OS/2's multitasking capability without creating completely different sets of source code for each version. Thus, most vendors have found it

easier to maintain a different version of a program for each environment, rather than use one program that works in both environments. So, while we may yet see a few family applications, these programs will most likely go the way of the slide rule or CP/M.

Under OS/2, each program runs in its own full-screen session. You can have a dozen different sessions, each running a different program, at the same time. When a session is viewable on-screen, it is said to be running in the *foreground*. All other sessions continue to run in the *background* until you bring them into the foreground and display them on your screen. The compatibility box is a special session that runs only when it is in the foreground. It is frozen when you move it to the background.

OS/2's graphical interface, the Presentation Manager (PM), runs in a special session of its own. A special class of OS/2 programs, called Presentation Manager applications, are specifically written for the PM. These applications run in the PM's session and are displayed in windows. There is only one active window at a time on the PM screen. The application running in the active window is the foreground application.

PM applications are completely different from other OS/2 applications. But because both use the same underlying OS/2 video facilities, it is possible to run well-written non-PM OS/2 applications in a PM window. Thus, non-PM programs that use OS/2's video systems can run in a PM window virtually without modification.—Richard Hale Shaw

■ OS/2 DATABASES



OS/2 Databases: Summary of Features

(Products listed in ascending price order)

	Q&A OS/2 \$349	Paradox OS/2 \$725	R:BASE for OS/2 \$895
Program type	Flat-file	Relational	Relational
PROGRAM SIZE			
Installed program size (kilobytes)	1,279	927	3,138
Minimum number of program files	8	9	7

OS/2 CHARACTERISTICS			
Separate DOS and OS/2 versions	●	●	●
DOS version can run in OS/2 compatibility box	●	● (Paradox 3.0 only)	●
OS/2 version			
Is a Presentation Manager application	○	○	○
Runs unmodified in a PM window	○	○	○
Lets user write multitasking applications	○	○	○
Lets user write multitasking applications	○	●	○
Allows multiple copies of the program to share the same database	●	●	●
Notifies user that a file or record has been locked by another session	●	●	●
Program automatically redisplay records modified by another session	○	●	○
User can specify priority of programs when the application is running in foreground or background	○	○	○
User can assign additional OS/2 memory to program	○	●	○

FILE STRUCTURE LIMITS			
Field size (characters)	1,678	255	4,096
Fields per record	2,182	255	400
Fields per database	2,182	Unlimited	800
Record size (bytes)	16,780	4,000	4,096
Records per data file	16 million	2 billion	Unlimited
Data files per database	2	Unlimited	78
Records per database	16 million	Unlimited	Unlimited

DATA FIELD TYPES AND MAXIMUM SIZES			
Character fields (characters)	●(255)	●(255)	●(1,500)
Long text fields (characters)	●(1,678)	○	●(4,050)
Numeric fields (digits)	●(15)	●(15)	●(9)
Currency fields	● (7 bytes)	● (15 characters)	● (16 characters)
Date fields	● (15 bytes)	● (11 characters)	● (30 characters)
Time fields	● (18 bytes)	○	● (20 characters)
Boolean fields	● (1 byte)	○	○

●—Yes ○—No

(30-61942)

will be possible for a program in one session to overwrite the changes made in another session without the second session knowing it. Or the second session might indefinitely be locked out of a table or record. Since you can view the same data in different windows or sessions, a program should provide facilities to update the data displayed in one session when it's changed by another. If not, what's the point of being able to display it at all?

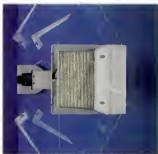
A LOOK AT THE DATABASES Externally and internally, *Paradox OS/2*, *Q&A OS/2*, and *R:BASE for OS/2* are very close to being pure ports of their DOS counterparts. Only the underlying interfaces have been modified to accommodate OS/2 system calls.

Not one of these products was written for the Presentation Manager. These are OS/2 character-mode applications; they do not utilize the PM's graphical user interface. With a minor exception in the case of *R:BASE*, all three run fine in a PM window. I used a program found in the Microsoft OS/2 Software Development Kit to modify a non-PM OS/2 program to run in a PM window. This was easy to do, but I was surprised that two of the three vendors hadn't tried this, and none of the programs arrived already modified. While the modification program is not yet available outside of the OS/2 Software Development Kit, I suspect that Borland, Symantec, and Microrim will be modifying their programs before they ship in the future.

Nor do any of these programs offer the ability to access OS/2's multitasking capability, although *Paradox OS/2* does offer a means of building multitasking applications. *Multithreading* is a special form of multitasking that allows programs to divide themselves into more than one task at the same time. If, for example, multitasking were available in *Paradox's* PAL language, you could instruct *Paradox* to run a PAL command or subroutine as a separate task—without running another instance of *Paradox*. Even better would be an alternative to *Paradox's* Do...it! key. Instead of using Do...it! to start a command, this key would start the command as a separate task.

The product literature accompanying each DBMS calls for 2 to 3MB to run

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■ OS/2 DATABASES

them. This figure may sound high, but it includes the memory required by both the program and OS/2. In reality, though, you'll probably want to have about 4MB or 5MB to get high performance out of them—especially if you're going to run several other applications simultaneously. And in the case of *Paradox*, which gives you the option of making even more memory available, you can gain an additional performance return on your investment in RAM.

While we tested these three OS/2 DBMS programs against their DOS counterparts, we had also hoped (in the case of *Paradox* and *Q&A*) to test them against their 386-optimized versions. Symantec, however, has stopped selling its 386 version of *Q&A*; it claims to have incorporated some of that product's optimizations into the OS/2 edition. Borland still offers *Paradox* 386, which we tested against *Paradox* OS/2.

ARE YOU READY FOR OS/2? The answer to this question, as always, depends on your needs. Will you find it valuable to access and run more than one program at the same time? Will the applications you use most be available under OS/2?

Assuming that the applications become available—and that just might be a grand assumption, at least for the near future—will the overall productivity gains offered by OS/2 be enough for you to make the move? For power users who need to perform many operations at the same time, the answer is a resounding yes. For other users it will depend on how important they believe multitasking is.

How valid is the argument that the power offered by an OS/2 database application is reason enough to make the switch? If you are a database applications developer, you should probably move to OS/2 as quickly as your DBMS of choice becomes available. There's no better environment for developing applications—even those for DOS. You can't beat OS/2's ability to test applications, compile code, write code, and maintain a database at the same time. If you want to run multiple queries or lengthy reports while performing other tasks (whether or not these are database-related), then an OS/2 version of your favorite DBMS might be for you.



OS/2 Databases: Summary of Features

(Products listed in ascending price order)

	Q&A OS/2 \$349	Paradox OS/2 \$725	R-BASE for OS/2 \$895
DATA FIELD ATTRIBUTES			
Tests for valid data ranges	● (automatic)	● (user-defined)	● (automatic)
Provides default values	●	●	●
Checks for specific values	● (automatic)	● (user-defined)	● (user-defined)
Verifies data via a lookup table	○	●	●
Provides automatic data entry from lookup table	● (automatic)	● (user-defined)	● (automatic)
Performs double-entry verification	● (automatic)	● (user-defined)	● (user-defined)
Requires all fields to be filled	● (automatic)	● (user-defined)	● (automatic)
Offers "forced uppercase" option	● (user-defined)	● (user-defined)	● (user-defined)
Converts date formats	● (automatic)	● (user-defined)	● (automatic)
Increments fields	● (user-defined)	● (user-defined)	● (user-defined)
Unique fields	● (automatic)	● (automatic)	● (automatic)
Fixed values for data entry fields	● (automatic)	● (user-defined)	● (user-defined)
Calculated fields on entry screen	●	●	●
Carryover from previous record	● (automatic)	● (automatic)	● (user-defined)
Error handling	● (automatic)	● (automatic)	● (automatic)
Data dictionary/catalog	○	● (automatic)	● (automatic)
User-accessible data dictionary	○	● (automatic)	○

DATA IMPORT/EXPORT			
.DBF	●●	●●	●●
.DIF	●●	●●	●●
.PFS	●○	●●	○/○
.SDF	●●	●○	●●
SYLK	○/○	○/○	●●
.WKS	○/○	●●	●●
ASCII	●●	●●	●●
DB2 and SQL DS	○/○	○/○	○/○
User-defined	○/○	●●	●●
Specific minicomputer format	○/○	○/○	○/○
Specific mainframe format	○/○	○/○	○/○

DATA MANIPULATION			
Maximum number of indexing files	115	255	Unlimited
Maximum number of compound indexes	N/A	255	800
Unique index value	○	●	○
Respecify indexed fields	●	●	●
Automatic index maintenance	●	●	●
Respecify file definition	●	●	●
Multiple record deletions	●	●	●
Multiple record updates	●	●	●
Math updates	●	●	●
Text updates	●	●	●
Maximum number of view tables	1	Unlimited	5

●—Yes ○—No N/A—Not applicable: the program does not have this feature

(continues)

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CIRCLE 296 ON READER SERVICE CARD

■ OS/2 DATABASES

But remember that the feature that makes OS/2 programs immediately attractive—the ability to perform several tasks simultaneously—is not part of the programs themselves. It is an intrinsic part of OS/2. That doesn't make OS/2 applications any less powerful; it just puts their power in perspective.

Should you consider switching to OS/2 for the sake of using one OS/2 program, even if you don't expect to use a lot of other OS/2 applications? Although the speed of some applications will improve under OS/2, other programs will slow down. In the latter cases, it's important to weigh an

What we need are Presentation Manager versions of these programs.

application's performance against its multitasking capabilities. For example, it's more convenient to keep a DBMS running and available in a separate session or window while you work on something else than to stop what you're doing and start the DBMS every time you need it.

THE FINAL WORD The jury may still be out on when will be the right time to switch to OS/2. What is clear is that OS/2 applications—and OS/2 itself—still have a way to go before they are what we want them to be. Even more important than adding multithreading capabilities to the current crop of OS/2 databases, we need Presentation Manager versions of these programs. As *PC Magazine* contributing editor Charles Petzold said of PM programs in his article "The Truth About Presentation Manager" (*PC Magazine*, April 11, 1989), these are "the applications you'll be using for much of the next decade." All of the vendors of the reviewed products refused to comment on PM versions of their products, a sure sign that these are under development. The step to the Presentation Manager will make these programs even more exciting.

Paradox OS/2

Paradox OS/2 (\$725) is Borland International's first entry into the OS/2 application market. This programmable DBMS (database management system) is an OS/2 port of *Paradox*, Version 2.0, which received an Editor's Choice designation in last year's Project Database (see *PC Magazine*, May 17, 1988, for a review of *Paradox*, Version 2.0). The OS/2 version provides a multitasking alternative to Version 2.0, which the vendor still sells to users of floppy disk machines; *Paradox 386*, a version optimized for the Intel 80386 microprocessor; and the latest addition to the family, *Paradox*, Version 3.0. The last has a number of new features, including additional set operations and the ability to create multitable forms, to perform cross-tabulations, and to create instant graphs.

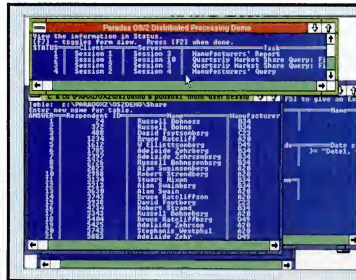
Paradox pundits are already familiar with the program's set-oriented, table-driven approach to database management. That hasn't changed in *Paradox OS/2*. *Paradox* stores all data in tables and places query results in an Answer table. The *Paradox* Query-by-Example (QBE) form even looks like a table. Each table consists of rows and columns (known in other DBMSs as records and fields) of data, and you perform most operations on sets of rows.

Paradox OS/2 has retained the other familiar features of *Paradox*, Version 2.0. The *Lotus 1-2-3*-like menus, the powerful PAL (program assembly language) appli-

cation development language, and the Personal Programmer application generator are all available. Furthermore, the same close-knit relationship exists between PAL and the *Paradox* menus, so you can use *Paradox* menu commands in your PAL scripts. Coupling PAL with the program's keyboard-recording facility, you can manually test a series of keyboard commands, record them, and use them as a script. You can even add PAL commands to the script to make it a complete PAL program, menu commands and all.

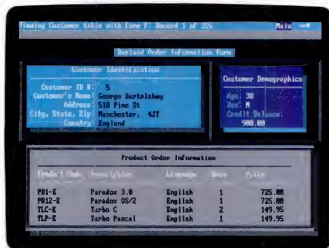
File and record locking with automatic refresh were already available in Version 2.0 last year, and you'll find them in *Paradox OS/2*. With *Paradox*, Version 2.0, two different workstations can modify the same table on a network file server at the same time. If one workstation changes a record or row displayed on the screen of the other, Version 2.0 automatically redisplay the changed row. *Paradox OS/2* behaves the same way, whether the "users" modifying the table are network file servers, OS/2 sessions running *Paradox OS/2*, or both. Thus, you can edit or coedit a table and the changes you make will appear in the other session's window. *Paradox OS/2* also allows you to set the refresh rate—the rate at which the changed data appears on the other session's screen.

While *Paradox OS/2* doesn't have a mouse interface, it does run well in a Presentation Manager window and appears to be a well-behaved OS/2 application. It maintains complete table and application



Paradox OS/2's Session command allows you to write multitasking PAL applications. Here the top window monitors the reports and queries running simultaneously in other windows.

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With Paradox 3.0, there are no Unclears, no Unknowns. You don't need an army of in-house technical support people. And best of all, you *don't have to be a programmer* to be a pro with Paradox. It's all gain, no pain.

✓ "Query-by-Example" for example

Use this checkmark and you're using QBE. It's that easy. Let's say you need to know in a hurry which of your Los Angeles customers bought more than 5 pairs of white shoes. First ✓ the customer field, then type "LA," "white," and ">5," and you're done. Paradox gives you the right answer right now. And how much programming to do all that? Zero.

If your database experience so far is limited to the flat-file type rather than relational, or even if a

spreadsheet is the only program you've used before, Paradox gets you up and running immediately with just a ✓.

Record-locking and Auto-Refresh make the network safely network

Paradox has become the leading networker because it handles multi-users intelligently. If someone in your group or network has accessed a record, automatic record-locking keeps everyone else from changing it.

That way, two or more people can't change the same data at the same time. (As a bonus, Paradox also tells you *who* is using a record at a particular instant.)

Once the record has been changed by someone in the network, *Auto-Refresh* kicks in *automatically* and updates everything. Everyone in the network is looking at up-to-the-minute information.

Paradox, for the looks of things

Presentation-quality graphics are another Paradox distinction. They give you and your work the professional look.

Paradox instantly turns your tables into graphs with *one* keystroke—and in multiuser environments, with a few keystrokes your graph can show up-to-the-minute changes. Not only does everyone get the picture, they get an accurate picture.



Award-winning Paradox Family

Paradox 3.0 is the latest addition to the award-winning Paradox Family. Paradox OS/2 and 386 received PC Magazine's BEST OF 1988 AWARD in the database category.

✓ it out

To order a trial version of Paradox 3.0 (\$14.95) or a demonstration disk (\$4.95), call (800) 345-2888, extension 100. Paradox owners may upgrade (\$175.00) by calling (800) 331-0877. (Please have your serial number available.)



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■ OS/2 DATABASES



OS/2 Databases: Summary of Features

(Products listed in ascending price order)

	Q&A OS/2 \$349	Paradox OS/2 \$725	R:BASE for OS/2 \$895
DATA MANIPULATION			
Maximum number of join tables	N/A	Unlimited	2
Maximum number of project tables	N/A	Unlimited	1
Maximum number of union tables	N/A	Unlimited	2
Maximum number of intersect tables	N/A	Unlimited	2
Maximum number of append tables	1	Unlimited	1
Maximum number of open data files	2	Unlimited	80
SORTING			
Permanent	○	●	○
Temporary (for duration of command)	●	●	●
Sorts on any field	●	●	●
Sorts on indexed field only	○	○	○
Maximum number of fields sorted at once	Unlimited	255	Unlimited
SEARCH PARAMETERS			
First occurrences	●	●	○
All occurrences	●	●	●
Indexed field only	○	○	○
Multiple fields (maximum number)	● (2,182)	● (255)	● (unlimited)
Case-sensitive	○	○	●
Whole word	○	○	●
Value or character range	●	●	●
Wildcard or string segment	●	●	●
Boolean	●	●	●
Compound Boolean	○	●	●
QUERY FACILITIES			
Query language	○	●	●
Proprietary	N/A	●	●
dBASE III-compatible	N/A	○	○
SQL-compatible	N/A	○	●
Other	N/A	○	○
Query by example	○	●	●
Query by forms	●	●	●
Multiple file access	●	●	●
Query editor support	○	●	●
Stored queries	○	●	●
MATHEMATICAL FUNCTIONS			
Date arithmetic	●	●	●
Time arithmetic	●	○	●
Arithmetic functions	●	●	●
Exponential functions	○	●	●
Trigonometric functions	○	●	●
Financial functions	○	●	●

●—Yes ○—No N/A—Not applicable the program does not have this feature

(continues)

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"WordPerfect 5.0's colossal
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me." - Stone, Federal Computer

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publishing word p-
- Jim Seymour, PC Comput

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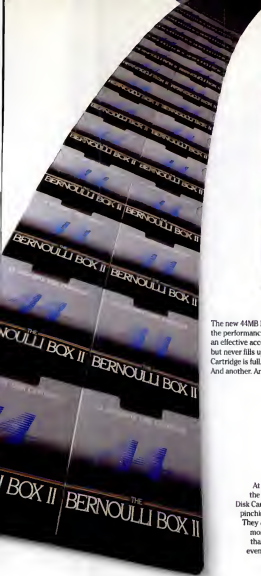
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CIRCLE 378 ON READER SERVICE CARD

■ OS/2 DATABASES



OS/2 Databases: Summary of Features

(Products listed in ascending price order)

	Q&A OS/2 \$349	Paradox OS/2 \$725	R:BASE for OS/2 \$895
MATHEMATICAL FUNCTIONS			
Aggregate functions			
Totals	●	●	●
Subtotals	●	●	●
Average	●	●	●
Count	●	●	●
Maximum	●	●	●
Minimum	●	●	●
STATISTICS			
Standard deviation	○	●	●
Variance	○	●	●
COMMAND STRATEGY			
Static menus	●	●	●
Dynamic menus	●	○	●
Typed commands	○	○	●
Mouse support	○	○	●
MACROS			
Automatic recording	●	●	●
Keystroke macro	●	●	●
Macro language	●	●	●
INPUT FACILITIES			
Maximum number of screens per file	10	15	Unlimited
Maximum number of files per screen	1	Unlimited	5
Screen definition			
Painting	●	●	●
Coordinates specification	○	●	○
Automatic field-name placement	●	●	●
OUTPUT FACILITIES			
Multiple-file reports	○	●	●
Page breaks	●	●	●
Breaks when fields change	●	●	●
Report definition method			
Painting	●	●	●
Forms duplication	●	●	●
Automatic	●	●	●
Predefined mailing labels	●	○	●
Programmable	●	●	●
Stored report definitions	●	●	●
Line-based	●	●	●
Form-based	●	●	●

●—Yes ○—No

(continues)

compatibility with previous versions of *Paradox*, so you won't have to convert any files. In addition, Borland has incorporated *Paradox*-compatible tables into *SideKick for Presentation Manager*, allowing you to access and modify *SideKick* files from *Paradox OS/2* and write PAL-based workgroup applications in *SideKick*.

MAKING THE BEST OF OS/2 *Paradox OS/2* offers significant features that take advantage of OS/2 and that neither of the other two DBMSs reviewed here provides. The first is a set of command-line parameters: *Memsizes* and *Kswap*.

The *Memsizes* parameter allows you to configure the amount of memory that OS/2 allocates for *Paradox OS/2*. You can use

Paradox OS/2 not only outperforms its DOS counterpart, but it can greatly increase productivity.

this feature to improve *Paradox OS/2*'s performance. By default, *Paradox OS/2* uses 384K of memory for its data management. You can use *Memsizes* to increase this value, depending on the amount of memory you have available in your machine. In the PC Labs benchmark tests, we ran *Paradox OS/2* both with the default 384K memory allocation and with *Memsizes* set at 2MB. The latter configuration improved *Paradox OS/2*'s performance, cutting the time needed to run some of the tests by as much as 50 percent.

The *Kswap* parameter (also available in *Paradox 386*) configures the allocated memory. *Paradox* divides this memory into two pools: a general buffer space, used for PAL procedures and table information, and a virtual relation manager. If you are running an application that uses several PAL programs, for example, you can use *Kswap* to give more memory to the

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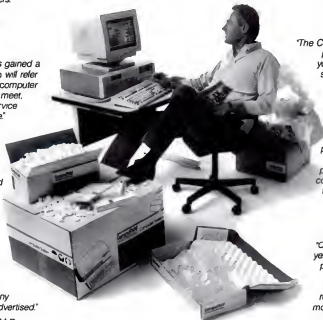
PC Magazine
February 16, 1988

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PC Magazine
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■ OS/2 DATABASES

general buffer space. This allows *Paradox* to manage its use of PAL programs better. If instead you use Kswap to give more memory to the virtual relation manager, allowing *Paradox* to keep more of a table's contents in memory, you'll lessen the program's need to access your hard disk.

Perhaps the most powerful feature of *Paradox OS/2* is the Session command. On the surface, this command seems quite run-of-the-mill, but coupled with many of the other features already mentioned, the Session command has significant implications that go far beyond what we've come to expect in contemporary PC database applications.

The Session command allows you to start another program or process under OS/2 that will be concurrent with the one you're already running. If you're familiar with OS/2, you know that you can start other sessions by using the OS/2, Version 1.0, Program Starter menu, or the Presentation Manager's Start Programs window. What's new here? PAL applications can use the Session command to run other programs concurrently in OS/2's multitasking environment. Specifically, PAL applications can run other instances of *Paradox OS/2*, which can run other PAL applications. Thus, using the Session command, you can write and run multitasking PAL applications.

PC MAGAZINE OS/2 Databases: Summary of Features (Products listed in ascending price order)			
	Q&A OS/2 \$349	Paradox OS/2 \$725	R:BASE for OS/2 \$895
OUTPUT FACILITIES			
Output destination			
Printer	●	●	●
Screen	●	●	●
Disk	●	●	●
DOS SUPPORT			
Allows changing default directory	●	●	●
Allows access from another directory	●	●	●
SECURITY			
Passwords for databases	●	●	●
Passwords for files	●	●	●
SPECIAL FEATURES			
Applications generator	○	●	●
Menu generator	○	●	●
USER SUPPORT			
Cost of telephone support	Free	Free	Free
Automatic on-line help	●	●	●
Tutorial	●	●	●
Prompt messages	●	●	●
●—Yes ○—No (ends)			

HUGE PRODUCTIVITY GAINS

The potential productivity gains from this one small addition to *Paradox* are enormous and immediately apparent to the *Paradox* power user or application developer. For instance, suppose your application has to run a time-consuming report. With another OS/2 DBMS, you could manually start another instance of the program and run the report. With *Paradox OS/2*, however, you can write the application to use the Session command to start another instance of *Paradox OS/2* that will run the report all by itself. When this happens under Presentation Manager, you'll see a new PM window open, and the second instance of *Paradox OS/2* will run the report in it. Meanwhile, your application will continue without pausing to run the report, instead letting another instance of *Paradox OS/2* run it. Thus, you can write multitasking applications with *Paradox OS/2*. In this way, you can have your applications spin off the time-consuming aspects of database management, such as re-

ports, sorts, and complex queries, into separate background tasks while you continue to work with other tasks in the foreground window.

And you won't have to give up anything in the way of performance to do this. In our tests, we found that *Paradox OS/2* outperformed *Paradox*, Version 3.0, completing some tasks in one-half to one-third of the time required by *Paradox*, Version 3.0. *Paradox OS/2* held its own against *Paradox 386*, too, particularly when we used the Memsize parameter to increase the former's memory allocation.

Paradox OS/2 not only outperforms its DOS counterpart, *Paradox*, Version 3.0, but it can significantly increase your productivity. If you're an applications developer, you can't beat its facility for writing multitasking applications. If you're a *Paradox* user, you'll appreciate the thought that went into making *Paradox OS/2* so easy to work with under OS/2. Considering all it offers, *Paradox OS/2* is this contributing editor's choice.



FACT FILE



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List Price: \$725
Requires: 3MB RAM,
286- or 386-based com-
puter, one hard disk and one high-density
floppy disk drive; OS/2, Version 1.0 or later.

In Short: This powerful DBMS provides
several features that take advantage of OS/2's
additional memory and multitasking capa-
bilities. Its applications and end-user interfaces
are identical to those of *Paradox*, Version
3.0, and *Paradox 386*. Its performance sur-
passes that of its DOS relatives. Not copy
protected.

CIRCLE 690 ON READER SERVICE CARD

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says a lot about what's on the inside.

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It brings together a 12-MHz 286 microprocessor and a long list of integrated features. All in a compact package that runs the latest applications, without



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Your users will find everything they need in a stand-alone

PC, perfect for their growing business productivity applications.

You'll also find a PC that's been rigorously tested with a wide range of network products, so it's compatible in virtually any network environment.

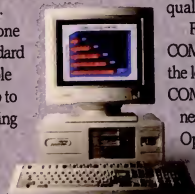
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Benchmark Tests: OS/2 Databases

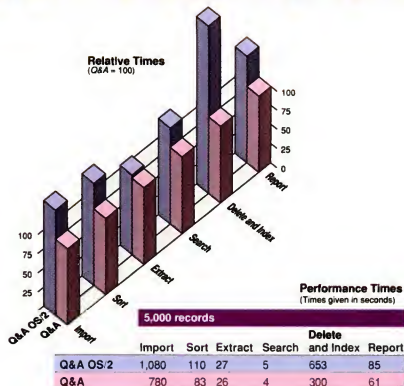
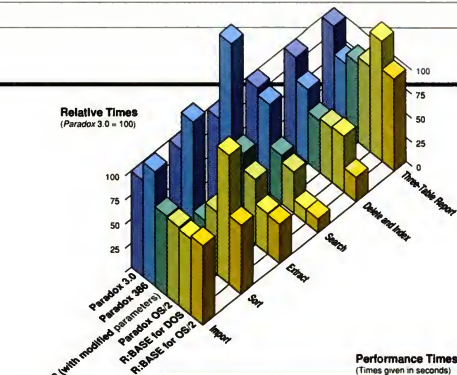
In both the 5,000- and 50,000-record benchmark tests, *R:BASE* for DOS is much faster than *Paradox* 3.0 in extracting, searching, and deleting and indexing data. Even though *Paradox* OS/2's performance is much better than that of *Paradox* 3.0 in these tests, it is not enough to surpass *R:BASE* for OS/2—or even *R:BASE* for DOS in most cases. Search and extract times are especially significant, since these are two of the most frequently used database operations.

While *R:BASE* for OS/2 and *Paradox* OS/2 are much faster than their DOS counterparts when sorting the 50,000-record database, *R:BASE* for OS/2 loses this edge on the 5,000-record test.

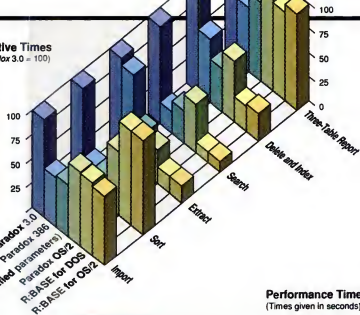
Our tests show that you can eke more performance out of *Paradox* OS/2—particularly in sorting data—by modifying the Kswap and Memsize parameters. To test its performance with altered parameters, we used “-kswap 75 -memsize 2048”. In other words, we upped the memory size for data management from the default 384K to 2MB; we also allocated more of the data space to the virtual relations manager, which manages files and indexes.

On our 50,000-record tests, *Paradox* 386 was not an exceptional performer, running significantly slower than *Paradox* 3.0 in importing, sorting, and extracting, but offering gains over that version in all other tests. On the 5,000-record tests, it was a different story. *Paradox* 386 ran the search test almost five times as fast as *Paradox* 3.0, though it still could not surpass *R:BASE* for DOS or *R:BASE* for OS/2.

Timing results are reported separately for Q&A, since it is a flat-file DBMS rather than a relational DBMS like the other programs. As a result, the performance times are not necessarily comparable. While Q&A OS/2 turned in respectable results compared with last year's crop of DOS-compatible flat-file databases, it was slower than its own DOS counterpart on most of our tests. Apparently OS/2 and Presentation Manager—which comprised our testing environment—introduced overhead that slowed the program down, outweighing any possible performance gains OS/2 might offer.



Relative Times
(Paradox 3.0 = 100)

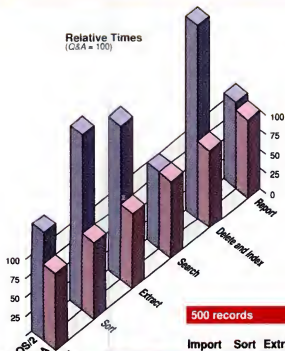


Performance Times
(Times given in seconds)

5,000 records

	Import	Sort	Extract	Search	Delete and Index	Three-Table Report
Paradox 3.0	161	142	40	18	195	331
Paradox 386	80	41	37	4	128	216
Paradox OS/2 (with modified parameters)	84	42	17	6	88	267
Paradox OS/2	122	92	14	9	123	331
R:BASE for DOS	120	137	7	2	51	301
R:BASE for OS/2	114	137	7	2	56	328

Relative Times
(Q&A = 100)



Performance Times
(Times given in seconds)

500 records

	Import	Sort	Extract	Search	Delete and Index	Report
Q&A OS/2	113	16	8	1	15	11
Q&A	80	7	4	1	6	10

To measure the performance of these database management programs, PC Labs ran the packages through six common DBMS operations: imports, extracts, deletes and indexes, sorts, searches, and report generation. The test results reported here do not include the time the reviewer took to set up an operation, but only the time the program took to perform the test. In cases where multiple steps were needed to set up a procedure, we timed all program operations and added them together for the final result.

The databases we used for testing represented the inventory and transaction records of a fictitious automotive parts distributor. Each database had one file with 12 fields per record. The field data types included integer, text, double-precision, and date. Because a given program's performance may vary with the size of the database, we report the results using separate databases of 500, 5,000, and 50,000 records.

We ran all tests on an IBM PS/2 Model 80-071 equipped with a 73MB hard disk, 8MB RAM, and IBM OS/2 Standard Edition 1.1. The OS/2 CONFIG.SYS contained the following specifications: BUFFERS=30, DISKCACHE=64, THREADS=128, FILES=20. Timing tests were run in a Presentation Manager window.

The **Import** test measures how quickly the database can import an ASCII file (of either fixed field length or comma-delimited format) with an index on the first field. We included the indexing portion of the test to avoid penalizing programs that automatically index the first field during data conversion.

The **Sort** test measures the time it takes for the package to sort the files on an unindexed field in ascending order.

The **Extract** test measures the time it takes the program to extract two fields from the database and send them to a RAMdisk or to the screen. As part of the procedure, the DBMS was also required to sort on one of the fields and select fields that matched one specific criterion. We output the file to a RAMdisk or to the screen to eliminate printer performance as a factor in the timed results.

The **Search** test measures the time it takes to locate the first record that satisfies two criteria (make = Ford and model = coupe).

The **Delete and Index** test measures the time required to remove columns from a Product table created for this task, and then to reindex the file if necessary.

For the relational DBMSs, the **Three-Table Report** test generates a report for those records whose "year" field is equal to 1988 or 1989. The report is made up of 16 fields and sorted (in ascending and descending order) on three of those fields. The test calculates two subtotals and the difference between them at one breakpoint, a subtotal at the second breakpoint, and a grand total at the end of the report. The resulting file is sent to a RAMdisk.

For the flat-file DBMS, the **Report** test records the time it takes to generate a relatively complex report, requiring the reviewer to complete the following tasks: (1) Extract records with fields that match either one or another amount (for example, the "year" field had to equal 1988 or 1989). (2) Select seven of the 12 fields in the record. (3) Sort on two fields, one in ascending, the other in descending order. (4) At the breakpoints in a specified field, calculate subtotals, then calculate the grand total at the end of the column. (5) Send the resulting file to a RAMdisk.

Q&A OS/2

Symantec Corp.'s Q&A has twice earned a *PC Magazine* Editor's Choice designation. A powerful flat-file DBMS, Q&A integrates filing, report generation, and forms and word processing. It includes a comprehensive reference manual, a flexible keyboard macro facility, an interactive disk-based tutorial, and on-line help, all of which make this program outstanding in its category.

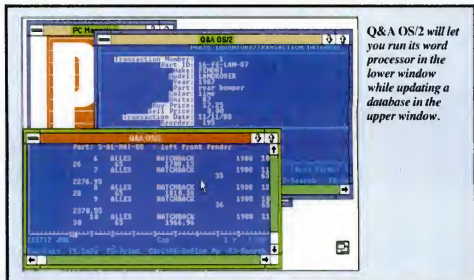
Q&A OS/2 (\$349) sports the same features as the DOS-compatible flat-file DBMS you've come to know and love, including complete data file compatibility. The OS/2 version offers what you would expect of any good OS/2 database program, including the ability to run a report or sort a database in one OS/2 session while adding or editing records in another.

Q&A OS/2 handles file and record locking under OS/2 just as it would on a network: it treats each OS/2 session as a separate network workstation and user. If you edit a record in one session, another session can display it. However, the second

Q&A OS/2 treats each OS/2 session as a separate network workstation and user.

session cannot change the record until the first one releases it. Conversely, if you display a record that is being modified by another session, Q&A OS/2 will inform you that the record can't be modified and will identify the session, or "user," that is editing the record. Once the other session has finished editing the record, Q&A OS/2 will redisplay the modified record on your screen.

This scheme has some restrictions. You can't edit a record in a database that you are globally changing in another session. And if you add records to a database while you're printing a report from it, the new



Q&A OS/2 will let you run its word processor in the lower window while updating a database in the upper window.

records won't show up in the report. Q&A OS/2's file sharing between sessions is not automatic; you must tell Q&A OS/2 which database files can be shared. And despite the way Q&A OS/2 makes each OS/2 session a "user," a single network workstation running OS/2 will be seen as one user on a network.

A MORE ROBUST WP The database portion of Q&A OS/2 aside, you'll find improvements in the program's built-in word processor. The DOS product's word processor could handle about 100 pages per document. Symantec claims the OS/2 version can handle documents of 500 pages. To check out this claim, I created a 40-page document (every page filled with text) running the DOS version of Q&A in the OS/2 compatibility box. I saved the document to disk (creating a 100K file) and then read it into the OS/2 version of the product, which was running in an OS/2 Presentation Manager window. Once the document was in memory, Q&A OS/2 said it was only using 7 percent of the document space. Then I created a Q&A macro to add pages to the document by marking and copying the existing pages. I was able to fill the document space with more than 697 pages of full text (over 2MB once I saved it to disk).

A SLOW PERFORMER Unfortunately, that's just about all the good news. There's one area where this OS/2 product differs quite markedly from its DOS counter-

part—and that is performance.

While the other two OS/2 DBMSs for the most part outperformed their DOS versions, Q&A OS/2 was slower than its DOS version on all of the 500- and 5,000-record tests. Overall, it was the slowest performer of the three OS/2 DBMSs reviewed here. Whenever I used the DOS version (either under DOS or in the OS/2 compatibility box), it remained snappy in appearance and feel. Q&A OS/2 not only made a poor showing in the benchmark tests, but it looked and felt sluggish the entire time I used it.



FACT FILE



Q&A OS/2
Symantec Corp.
10201 Torre Ave.
Cupertino, CA 95014
(408) 253-9600
List Price: Free with purchase of Q&A, Version 3.0 (\$349); send in DOS disks and coupon for OS/2 disks.
Requires: 2.5MB RAM; 286- or 386-based computer; one hard disk and one high-density floppy disk drive; OS/2, Version 1.0 or later.
In Short: A flat-file DBMS for OS/2 that's very similar to its DOS counterpart. Although ideal for running in a PM window for quick-and-dirty filing tasks, this program does not deliver the performance of its DOS predecessor. Not copy protected.

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Sony Computer Peripherals

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■ OS/2 DATABASES

This sluggishness persisted whether I ran the database manager or the word processor. Once a word processor document was over 50 percent full, *Q&A OS/2* slowed down enormously. Moving from the top to the bottom of such a document took a full 5 seconds on a PS/2 Model 80. This wasn't because of disk accesses, since there weren't any (*Q&A OS/2* keeps the entire document in memory). The cul-

Although still an excellent product, *Q&A OS/2* doesn't provide much of an edge over *Q&A* for DOS.

prit seems to be the program's document reformatting procedure. You can switch to another PM window to work on something else while document reformatting is taking place, but reformatting slows *OS/2* down too much to be useful. Symantec should probably place the reformatting code in a separate *OS/2* subprocess (or thread) so other programs won't be affected by it.

In addition, *Q&A OS/2* doesn't seem to understand the *OS/2* keyboard interface very well. The on-screen NumLock and CapsLock indicators turned on and off at odd times. This occurred whether I edited a record or used the word processor—even though I didn't use either of those keys. Furthermore, some of the program's error messages are rather cryptic. For example, when I filled up the word processor document, *Q&A OS/2* insisted that *OS/2* had run out of virtual memory swapping space, even though I still had 9MB of storage on one drive and 16MB on the other. I could still start other programs, which wouldn't be the case if *OS/2* had really run out of virtual memory.

SHOULD YOU SWITCH? If you currently use the DOS version of *Q&A* and you've already made the decision to move

to *OS/2*, or if you're already using *OS/2* and you need a flat-file DBMS, you might consider *Q&A OS/2*. However, if the tool you use the most is *Q&A* for DOS and you don't have a strong need to move to *OS/2*, don't bother; at this time, *Q&A OS/2*, although still an excellent product, doesn't provide that much of an edge over *Q&A* for DOS.

I've found that any well-written DOS program will perform better when ported to *OS/2*. Representatives from Symantec insist that *Q&A OS/2* is not a straight port of the DOS version of *Q&A*. They must be right, or *Q&A OS/2* would have outperformed *Q&A* for DOS. If you've already decided to move to *OS/2*, you may want to run the DOS version in the compatibility box, or wait until Symantec or some other vendor fills the void with a powerful *high-performing* flat-file DBMS for *OS/2*.

R:BASE for OS/2

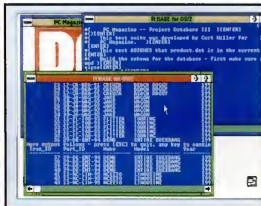
It was Microrim's idea to make *R:BASE* for *OS/2* and *R:BASE* for DOS look so much alike that at a glance you wouldn't be able to tell which one was running. Thus, from the outside, *R:BASE* for *OS/2* is identical to the DOS version, and you can use it transparently with tables and applications created by the DOS product.

If you're not already familiar with *R:BASE*, you'll find that it's a powerful DBMS for application developers. It consists of several modules, each of which is devoted to a specific facet of application

development, including database and forms definition and report and application generation. *R:BASE* also has a flexible import/export facility for moving data to and from other file formats, a text editor, and a developer's pseudocompiler. You can run the program from a menu or through a prompt-by-example command interface, where you select the command and *R:BASE* prompts you for the command parameters. A command-line mode is also available for power users.

R:BASE for *OS/2* is the only DBMS among the three reviewed here that supports Structured Query Language (SQL). It features a robust subset of SQL commands, which you can embed in the *R:BASE* procedural language. Although the SQL implementation is a subset, it's powerful enough to remove the burden of database manipulation from the procedural language, which you still use to control the logic of an application. This accounts for the fast performance of *R:BASE* for DOS in the PC Labs benchmark tests.

LEVELS OF LOCKS *R:BASE* supports three types of file and record locking. The program has concurrency controls for record, table, and database locking. It implements these with a complex queue mechanism, where one *R:BASE* session will gain access to a resource (be it a record, table, or database) in the order in which it places a request in the queue. If you're writing an application that utilizes transaction processing, take this procedure into account to



Application developers will enjoy *R:BASE* for *OS/2*'s ability to edit a program in the upper window while querying and updating a database in the lower window.



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— INFOWORLD, APRIL 1988

"Works extremely well on a local area network."

— THE QUANTUM PC REPORT FOR CPAs, OCTOBER 1988

"We tried everything we could — cutting power in the middle of posting, hitting oddball key combinations... but Platinum protected our data and did not exit to DOS until we logged off... Error handling is excellent."

— INFOWORLD, JANUARY 1988

"Platinum... may be reason enough to take the OS/2 plunge. [It] exploits OS/2 features available today in powerful and useful ways."

— BUSINESS SOFTWARE, MAY 1988

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— THE BOTTOM LINE, MAY 1988

"OS/2 Platinum let us pull our division's accounting off the mainframe and put it on micros — a tremendous savings. And Platinum's multitasking capabilities have given our data entry staff a three to four-fold increase in productivity over DOS accounting systems."

— Bob Emigh, TRW CREDENTIALS SERVICE

"With serial processing DOS accounting systems, it used to take days to generate all the reports needed for a snapshot of our business, and by the time the last report was done, the data on the first was no longer current. With OS/2 Platinum's parallel processing, we can get a complete real-time picture almost instantly."

— Joe Cruz, ROSE COOPERAGE



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■ OS/2 DATABASES

ensure that *R:BASE* executes each transaction in the correct order. This will not be a concern for most applications, however.

R:BASE for OS/2 treats each OS/2 *R:BASE* session as a user on a network, with your computer acting as both workstation and file server. You can modify the same table in two different OS/2 sessions simultaneously with the Edit Using data entry form command. All other database commands lock the entire table (or database). However, you still have to be careful when editing a table through a data entry form. I was able to edit a record in one session and overwrite the changes made by another session without either session receiving any notification. I would have preferred either *Q&A OS/2*'s approach of locking the record for update by only one user at a time or *Paradox OS/2*'s automatic redisplay of modified data.

R:BASE for OS/2 also doesn't tell you who has locked a table if you try to modify one at the same time as another session. Instead, you'll get a message like "Resources required by command are not available," which isn't particularly informative. You can use the List command to see whether *R:BASE* has locked a table, but it won't tell you who has locked it.

USING A MOUSE It surprised me to discover that Microim had implemented a mouse interface in *R:BASE for OS/2*, as

neither of the vendors of the other two databases reviewed here had done so. You can make use of the mouse to move the cursor as if you were using the arrow keys. You can click the left mouse button to select a menu entry or click the right one to escape from a menu. This will work fine just as long as you run the program on a full screen (that is, not in a Presentation Manager window).

If you do run *R:BASE* in a PM window, however, the program will ignore the PM mouse pointer. You'll find that any movement of a mouse will move the cursor down through the menu choices. When the cursor reaches the end of a menu, it leaps back to the top again. Furthermore, the

**In general, *R:BASE*
for OS/2 was the
fastest OS/2
database we tested.**

buttons don't respond as documented: if you click on the left mouse button, the cursor will jump past the current menu item and select the next one.

Things get worse when you try to ignore the mouse while you run *R:BASE* for OS/2 in different Presentation Manager windows. When you activate a different PM window, the cursor will fly all over the *R:BASE* menu as you drag the PM mouse pointer off that window. If you move the pointer to another *R:BASE* window, the same thing will happen. I found that the only way to get around this was to park the mouse pointer on the window border, which is an unnatural position if you're used to using the mouse under PM. Other than its quirky mouse interface, *R:BASE for OS/2* runs well under Presentation Manager.

GOOD PERFORMANCE In general, *R:BASE for OS/2* is the fastest OS/2 DBMS we tested. On our 5,000-record benchmark tests, *R:BASE for OS/2* was slightly faster than *R:BASE for DOS* on the Import and Join tests; it yielded the same or

PC EDITOR'S CHOICE

• The jury is out

Although the nascent product category of OS/2 databases is off to a good start with *Paradox OS/2*, *Q&A OS/2*, and *R:BASE for OS/2*, we cannot consider awarding any one of these programs an Editor's Choice designation until there are more products against which they can be compared. But if these three fine programs are any indication of what we can expect to see in the way of future OS/2 DBMSs, this will be an exciting product category to watch.

Already, this first group of OS/2 databases has a lot to recommend. *Paradox OS/2*, *Q&A OS/2*, and *R:BASE for OS/2* are completely compatible with their DOS counterparts. What's more, these well-behaved multitasking applications look and feel like their single-tasking DOS predecessors, allowing you to get up to speed quickly. Except for *Paradox OS/2*'s command-line parameters and its Session command, however, none of these DBMSs takes particular advantage of OS/2, beyond what is available to any well-designed OS/2 program. When Presentation Manager support is added to them, they are going to be outstanding OS/2 database management systems.

Do these three programs offer enough added functionality for you to move to OS/2 now? If you're already convinced of the advantages of using OS/2, the answer is yes. By using these programs, you can realize a net productivity gain—even if the OS/2 version does perform some tasks more slowly than its DOS counterpart. Otherwise, hang on: the Presentation Manager versions of these powerful DBMSs may be the ne plus ultra OS/2 applications everyone's been waiting for.



FACT FILE



R:BASE for OS/2,
Version 2.1
Microim Inc.
3925 150th Ave. NE
Redmond, WA 98073-
9722
(206) 885-2000
List Price: \$895 (for one

to three users).

Requires: 1MB RAM; 286- or 386-based computer; hard disk; OS/2, Version 1.0 or later.

In Short: This robust application development system is a must for *R:BASE* developers, regardless of whether they are building DOS or OS/2 applications. Not copy protected.

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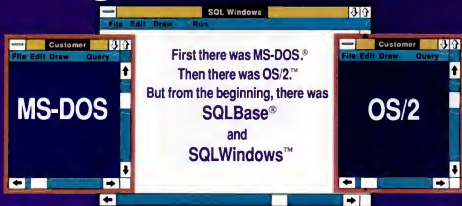
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■ OS/2 DATABASES

slightly slower results on the Sort, Extract, Search, Change Text, Project, and Remove Columns tests; and it was significantly slower on the Report, Pack, and Change Numeric tests. On our 50,000-record benchmark tests, however, *R:BASE for OS/2* shone compared with its DOS version when performing the Sort, Remove Columns, and Join tasks. Compared with the other DBMSs we tested, *R:BASE for OS/2* stood out in its ability to

R:BASE for OS/2
stood out in its
ability to search for a
record and change
text columns.

search quickly for a single record and change text columns. If you use *R:BASE* applications that perform these operations, this performance gain could be a strong incentive to move to *R:BASE for OS/2*.

If you're an application developer using *R:BASE for DOS*, you'll find it advantageous to use *R:BASE for OS/2* because of the intrinsic value of using an OS/2-based DBMS. You can edit an application in one window, sort a table in another, compile an application in another, and so on. The power that a well-behaved OS/2 DBMS offers should be enough incentive for every *R:BASE* developer to move to OS/2—even if it's to develop applications for *R:BASE for DOS*.

If you're an *R:BASE* applications user, switching to *R:BASE* is a borderline call. *R:BASE for OS/2* isn't spectacularly fast when compared with *R:BASE for DOS*, but for the most part it's a better performer. And if you'd like to run those time-consuming reports or table sorts in the background while working with other OS/2 applications in the foreground, then you should strongly consider switching to *R:BASE for OS/2*.

Richard Hale Shaw is a contributing editor of PC Magazine.

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The appeal of using PC forms software is purely pragmatic: it's cheaper. Forms made by a printer can cost 3 cents per copy in large volume, while producing forms internally with forms software and a laser printer costs only a penny per copy. Moreover, forms software

ALTERNATIVE APPROACHES TO FORMS SOFTWARE

The word processing, spreadsheet, or database program you already own may be all you need to handle forms.

The forms-processing market has spawned a healthy assortment of standalone packages. But these aren't the only game in town—some major applications programs are forced to be reckoned with at this task. You probably wouldn't want to buy a high-end spreadsheet or database just for handling forms. But if you have your eye on one of these software heavyweights anyway, or if you already own one, its finesse with forms may be all you need.

One of the best alternatives for forms processing is *Microsoft Excel*. The elements of most forms are particularly well suited to treatment as spreadsheet cells. *Excel* lets you create boxes around cells or ranges, add a line to any edge of a cell, or fill a cell with background shading. You can adjust the heights of rows as well as the widths of columns and mix different fonts in the same spreadsheet. Since the program runs in graphics mode, it takes most of the guesswork out of positioning the parts of your form.

On the *Lotus 1-2-3* side of the great spreadsheet divide, you'll find Funk Software's *Always*. This add-in answer to *Excel*'s formatting prowess lets you incorporate all the above-mentioned goodies into *1-2-3* spreadsheets. *Always* even

goes *Excel* one better by allowing more fonts per document and more levels of background shading. Although *Always* lets you do all your formatting in a WYSIWYG mode, you must return to *1-2-3* to change the actual contents of any cell or to insert spreadsheet rows or columns. But since you can toggle between the two programs with a single keystroke, this is less of a problem than it might seem.

The form-as-spreadsheet option does have its drawbacks. After you establish the column widths for one part of your form, you may find these unsuitable for another part lower down. This means subdividing the original columns into a number of smaller ones to give you the flexibility you need in horizontal positioning. Another limitation is that there's no easy way to store the data separately from the form itself. On the positive side, though, you have more power available for calculated fields than any forms package could hope to muster.

Microsoft Word can also be a highly capable tool for creating forms. It lets you enclose columns of text in side-by-side boxes that expand or contract vertically as you add or delete lines. The boxes' vertical borders always remain intact,

even when they contain different sizes of proportionally spaced type. Microsoft, in Version 5.0 of *Word*, has enhanced this capability with such niceties as variable line thickness, adjustable background shading, and a graphics-mode print preview.

If you want to fill in a *Word* form by hand, hidden markers will let you move from one fill-in field to the next with a single keystroke. Alternatively, you can assign a mail-merge field to each blank and then merge in records from a comma-delimited ASCII data file, a format that can be produced by most databases. If you don't import the data, the program can prompt you to type it in for each field at print time. You can even create automatically calculated fields.

Finally, if you want to turn reams of database records into filled-out forms, you may find all the necessary tools in a surprising place: *dBASE IV*. With its latest version, Ashton-Tate has given this venerable product a much-needed and most welcome face-lift, and it now outstrips most of its competition in the quality of its printed output.

The *dBASE IV* report generator lets you put together a respectable form with the aid of line- and box-drawing tools,

can help cut down on inventory and distribution costs, as well as the costs of filling in the forms manually.

FRAUGHT WITH WASTE Maintaining an inventory of forms is costly. It's not uncommon for a large company to use thousands of different forms. Stockpiling all these forms takes a substantial up-front capital outlay, and it also means paying for the space, cabinets, and shelves needed to store them, as well as for the people to oversee them. Yet the forms often sit around in boxes for months. And if a form changes, then the entire remaining inven-

tory must be thrown out. And making even a minor change to a typeset form means reprinting it because the typesetter's engraved steel plate can't be altered.

Forms software minimizes these costs. With it, you can produce forms yourself when you need them or, literally, as you use them. This can eliminate most if not all of your inventory problems. In some cases you can cut shipping costs as well, because you can send the original form templates to your branch offices by modem. Changing forms becomes a matter of rearranging dots on a screen and can be done in hours rather than weeks.

Additionally, many forms software packages allow you to fill in forms electronically. This guarantees the correct field alignment and lets you correct mistakes without wasting a printed form. Some packages can automatically export the data you've filled into a form to a database, cutting down on duplicate data entry.

With all these reasons to use forms software, it's no wonder that the market has caught fire. According to statistics from Dataquest, a market research firm in San Jose, California, sales of PC forms software grew by 92 percent last year (see chart). And Dataquest further predicts that

automatic text centering, and limited word-wrap capabilities. The program supports a good range of printers and lets you print text or fields in boldface, underlined, or italic type. You can add more print attributes to the predefined font menu selections. Moving any portion of your form or resizing a box is simply a matter of defining and reorienting it with the cursor.

dBASE IV won't give you sophisticated handling of proportional spacing or WYSIWYG viewing. But when it comes to entering and storing form data, this option has few rivals.

These are the most-powerful alternatives to standalone forms processors, but they're not the only ones. Among word processors, *XyWrite*, *Nota Bene*, and *WordStar 2000* are notable for their features aimed specifically at forms creation, and *WordPerfect's* formatting muscle should prove well suited to some tasks. On the database side, *R:BASE* offers a report generator with line-drawing capability and some printer control. And if you just want to create forms to be filled out manually, a desktop publishing package or object-oriented drawing program may do the trick for you.

—Robert Kendall

from now through 1992 sales will grow by an average of over 37 percent a year. Indeed, the sudden blossoming of the forms software market is having its impact on the preprinted forms business. Already, the smarter outfits are using forms software to quickly sketch out new forms for their customers. Being able to show the customer a sample form to their specifications in a few days becomes a valued part of their sales pitch.

DESIGN, PRINT, OR BOTH? The forms software on the market today falls into three categories. Form-design pack-

ages like *FormTool* from Bloc Publishing Corp. are suited to companies whose forms are typically filled in by hand. Such companies aren't concerned with electronic data entry but would like to save on printing and inventory expenses.

Fill-only packages, which allow you to enter data into preprinted forms from your PC keyboard or to merge it in from a disk file, are targeted at users who already have preprinted forms and are more interested in producing many of them quickly. For this article, we chose not to review these packages, which include *Blankity Blank* from Softstream Technologies, *On Form* from Triggs Data Systems, *Print-A-Form* from Deluxe Computer Forms and Supplies, *Forms-Typer* from Universal Computer Systems, and *Laser-Ready* from Mind Path Technologies.

But the products that can be used for both jobs are starting to dominate the marketplace because of their all-in-one approach. Most of the programs we review can be used to fill in forms as well as to create them, and in some cases you can even export this data to a database file. However, they vary widely in the degree of aplomb with which they handle design and fill-in tasks. Some are much better at design tasks than others, and almost all of them fall short in one or another aspect of data entry and management.

In this issue, we review 16 forms packages, ranging in price from \$49.95 to \$495. To compare them, we designed a suite of tests covering the range from form creation to data entry and export. Not all the packages were designed to do all these things, and consequently some were not able to complete the following tests:

- Create a simple form
- Create a complex form
- Fill in a form
- Import data to fill in a form
- Perform calculations on filled-in data
- Export data from a filled-in form to a database.

The simple form, a purchase order form from a standard forms catalogue, tests the most-basic design skills of the programs. To exercise the packages with more-sophisticated features and capabilities, we used a travel expense form that was created according to our specifications by FormGen Corp., the makers of *FormGen Plus*.

In addition to the packages we review, the following are due to be released this year: *FormCreator*, from SoftView Technologies, and *FormBase*, from Xerox Desktop Software.

WYSIWYG—THE WAY TO GO The packages we reviewed offer different approaches to forms design. The most-elegant programs use a WYSIWYG (what you see is what you get) graphics display. Often running under graphical environments like *Microsoft Windows* or *Digital Research's GEM*, they combine the text-handling capabilities of a desktop publishing program with the graphics abilities of a paint or drafting program. *Per:FORM* from Delrina Technology, *JetForm* Design from Indigo Software, and *Horizon* from FormMaker Software epitomize this approach.

The WYSIWYG programs are clearly the most accomplished at the job of forms design. Because they operate like paint programs, they are easy to use. You pull lines and stretch boxes physically across the screen page until the form takes shape exactly the way you want it to look on paper. Similarly, you can place text on the form in its own true font style and point size.

With these packages, your aesthetic judgments have immediate impact—you don't have to go through the tiring dance of printing, making adjustments, and printing again to see how a form is developing. You can see the effect of putting a light halftone behind certain boxes, how an arrow looks instead of a bullet, or what using 36-point type instead of 24-point does to the visual focus and balance of the form.

In general, you can produce more-refined form designs with the WYSIWYG systems. Rounded corners, arcs, and angled lines are also more common in WYSIWYG programs than in the others. Better yet, many packages offer a snap-to-grid function that locks elements onto points on a measured grid so that they line up precisely. With such a feature, even the shaky-handed can draw beautifully accurate forms.

But WYSIWYG has its drawbacks. Given the complexity of the graphic information they are required to process, display, and print, the WYSIWYG programs

Spreadsheet Rivalry Heats Up

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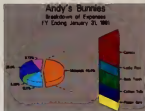
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and compatible computers but also takes full advantage of 286 and 386 machines when you decide to make that transition.

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Dinner	\$3,500,000	\$1,750,000	\$1,750,000	\$0	\$0
Total	\$6,000,000	\$3,000,000	\$3,000,000	\$0	\$0
Cost of sales					
Food	\$3,000,000				
Beverages	\$1,000,000				
Supplies	\$500,000				
Total	\$4,500,000				
Gross Profit		\$1,500,000			
Operating Expenses					
Salaries			\$2,000,000		
Rent			\$500,000		
Utilities			\$250,000		
Advertising			\$250,000		
Total			\$3,000,000		
Operating Profit				\$1,500,000	
Net Profit					\$1,500,000
1987					
Food					
Lunch	\$2,000,000	\$1,000,000	\$1,000,000	\$0	\$0
Dinner	\$3,000,000	\$1,500,000	\$1,500,000	\$0	\$0
Total	\$5,000,000	\$2,500,000	\$2,500,000	\$0	\$0
Cost of sales					
Food	\$2,500,000				
Beverages	\$750,000				
Supplies	\$375,000				
Total	\$3,625,000				
Gross Profit		\$1,375,000			
Operating Expenses					
Salaries			\$1,750,000		
Rent			\$400,000		
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Advertising			\$250,000		
Total			\$2,600,000		
Operating Profit				\$1,375,000	
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■ FORMS SOFTWARE

are ravenous consumers of disk space and computer resources. For this reason, you may prefer to work with one of the programs that show lines, boxes, and text on the screen, but not in the exact thicknesses and fonts that will print on the paper forms. The exemplars of this approach are *FormGen Plus* and *FormTool* from Bloc Publishing Corp.

Because you have to pick up and drop different drawing tools and then drag shapes on the screen, a form can take some time to lay down on the WYSIWYG programs. By contrast, drawing a line with graphics programs like *FormGen* or *FormTool* can be as simple as hitting a function key—the line appears on the screen instantly. This can be important if your forms are graphically simple. For example, it took us only about 6 minutes to draw all the lines and boxes of our simple test form with *FormTool*. With *PerFORM*, it took closer to 40 minutes. The graphics-oriented packages take up less disk space and generally print faster as well.

Two of the products, *FormSet* and *Polaris Forms*, are essentially compilers for producing overlay forms that you then download to your LaserJet for printing over subsequent documents. They are awkward design tools at best. Instead of working with a form design on the screen, you use rigid programming commands and x,y coordinate numbers. You can't see the form on the screen until you compile your code and run it (although *FormSet* does have a preview mode).

The ungainliness of these programs shows in the time it takes to design a form with them. Our complex test form took about 9 hours to create in *Polaris Forms* and just over 4 hours in *FormSet*. The main appeal of these programs is in their print speed (especially when printing high volumes of the same form), and in the small size of their form files.

But the compilers don't always have a marked advantage in these realms. At a time when the software industry is moving toward graphic interfaces, these blind programs are an anachronism.

HOW PRETTY IS A PICTURE? Graphics capability lets you put logos and background images on your forms, a handy tool for making your forms look

snappy. Our complex form had the image of a computer in the background, which made it look very professional. Almost all the programs, even those of the compiler type, import graphic images, most commonly in the .PCX and TIFF file formats.

Some of the forms packages we review support scanners, which allows you to pull in a copy of a preprinted form and then adjust it to suit your needs. But this sounds more liberating than it is. Scanned images

■ The appeal of using PC forms software is purely pragmatic: it's cheaper. Moreover, forms software can help cut down on inventory and distribution costs.

are generally huge and unwieldy, and using them for data entry is pointless because they take so long to print out that it would be faster to fill them in by hand. *JetForm*, however, lets you convert a preprinted form into an ordinary form file by tracing over the image file after importing it. Only if you can do this do scanned forms make sense.

But it is data entry capabilities that set these programs apart. To be useful in the day-to-day work of filling in forms, a program should have the ability to distinguish between different types of numeric data and give you control over the number of decimal places. It should let you use check marks, insert date and time stamps automatically, enter calculated fields, and verify value ranges. The best programs offer even more specialized field formats for such data as telephone numbers and credit card numbers; they also let you create help screens or table look-up screens for users.

The compiler programs really fall down when it comes to data entry: you must depend on your database or word processor for the features these programs lack.

Among the others, the data entry features vary widely, from *FormGen*'s excellent field-definition capabilities to *JetForm*'s total lack of them (at least in its current release). None of them is perfect, however, so the one you choose will depend largely on your application. For example, if you plan to print large volumes of forms from an existing database, good file-import and export facilities are essential, and print speed also matters more.

WHAT'S IN THE FUTURE? Forms software is still a relatively new product category and is still evolving rapidly. Many of the programs we review have new versions coming within a short time after you read this, promising major new features. The trend, however, seems to favor the WYSIWYG packages with richer data entry facilities. The design-only and fill-only packages seem to be heading for transformation along these lines—or else for extinction.

Some industry watchers have speculated that forms software as a category will eventually be co-opted by desktop publishing programs on the design side and, especially, by database programs on the data entry side. The first logical step in this direction is the ability to import and export to dBASE files, and many forms software vendors already include this feature or are working toward it.

The widespread acceptance of forms software depends on vendors' addressing a few other issues as well. Data integrity is one. Packages need to let you protect data fields and control access to your forms before you can be expected to stake your business on them. Another issue is signatures. The legality of digitized signatures and other authorization methods has not been established. Undoubtedly, some companies will wait until these methods have passed the courtroom test before making a big commitment, in both time and resources, to forms software.

But forms software as it exists today can benefit you right now. With it, you can free yourself from burdensome paper stockpiles, keep up with changes to forms more easily, and start moving the data from the flood of forms you use every day directly into your computer.

—Henry Fersko-Weiss

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DisplayForm II

Deerfield Systems' *DisplayForm II* caters mostly to those who wish to fill in preprinted forms rather than create their own. It lets you scan in a form and attach database fields to the scanned image on-screen. You can then send both data and image to your laser printer, or just print the data onto a preprinted form. But though the \$495 package includes a graphics editor that you can use to create forms, it's not very well suited to this task.

DisplayForm II creates files in a screen-image format with a resolution equivalent to that of your monitor (80 by 100 dots per inch on EGA or VGA systems, or up to 160 by 200 dpi if you use a Wyse high-resolution monitor). Before printing, it converts these files into .PCX format. But if you want to edit a scanned .PCX file in the program's graphics editor, you must convert it to a screen-image file first, thus sacrificing the high resolution of the original.

Since the graphics editor is intended to handle scanner files, it is pixel oriented and thus is much less useful for forms creation than are editors that work with objects like lines and boxes. *DisplayForm II* does, however, have a good range of functions like box- and line-drawing tools, fill patterns, five fonts in nine different sizes, a set of symbols, and a feature for pasting in

DisplayForm II uses boxes to show you clearly where to enter your information on the form. Messages and menus at the bottom of the screen keep you posted on what to do next.

.PCX images. With it, we were able to reproduce all the design elements in our complex test form.

But problems arise when you try to manipulate parts of your form. In working with bitmapped images, it's all too easy to erase part of a word or a box, and it's very difficult to align or resize form elements since they can't be treated as discrete objects. Text is especially resistant to alteration.

These inherent liabilities are aggravated by design flaws. For one thing, there's no move command, although Deerfield Systems promises one in the product's next release. This means that relocating anything requires a cumbersome combination of copying and erasing. Not only does the program lack an undo command, but it writes each change to disk as you make it. After a disastrous blunder, you can't just abandon the version in RAM and call up the previously saved version. Finally, the graphics editor fails to display the correct aspect ratio of your form on the screen, making the image appear to be stretched vertically.

GOOD DATA ENTRY OPTIONS *DisplayForm II* is much better at filling out the forms. To create database fields on the screen image of your form, you simply size and position them with the cursor. The program includes a good selection of data-verification and formatting options, including numeric fields with range check-

ing. Other functions allow you to enter the system date or time automatically, to increment a serial number for each new form, or to require entry in a field before proceeding. The package offers an agreeably simple approach to defining calculated fields—you formulate equations by moving the cursor to each field in turn and inserting the desired math functions with the function keys.

DisplayForm allows you to store the form data in a dBASE-compatible database file, with a new record created for each completed form. It can also import information from dBASE or ASCII files. Unfortunately, the latter must be formatted rather unconventionally, with each record in a separate file and carriage returns after each field. Setting up a database is reasonably straightforward, but the program's error checking leaves something to be desired. At one point we entered an invalid command and the system froze up, forcing a reboot and destroying our database.

SLOW PRINTING *DisplayForm's* printing functions reflect its fill-in orientation. The program prints form data using a different set of soft fonts than those used by the graphics editor. This gives you high-quality print for filling out preprinted or scanned forms. But since the sizes of the printed fonts don't match the size of those on the form you've created using the graphics editor, it can be tricky figuring out how much room to allow for fill-in



FACT FILE



**DisplayForm II,
Version 4.0**
Deerfield Systems Inc.,
221 Elizabeth St.
Utica, NY 13501
(800) 356-8170
(315) 797-1805

List Price: Full version,

\$495; fill-in and print version (lacks forms creation and database setup), \$295.

Requires: 512K RAM, hard disk, graphics card and monitor (CGA, EGA, VGA, Hercules, Wyse, or Genius), DOS 2.0 or later.

In Short: *DisplayForm II* is designed for scanning in and filling out preprinted forms. Creating forms from scratch is an excessively cumbersome process and changing them is even more difficult. Printing is very slow and output quality is poor. Not copy protected.

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Fastback Plus
Fastback—a program that backs up your hard disk—is fast, and it is reliable. Now Fifth Generation has improved it. The company fixed the manuals and then put in help files that make the manuals nearly superfluous. Then it added data compression to save disk space and a utility that estimates how many floppy disks and how long the job will take.

With this program, we've copied 38 megabytes of data from one machine to another in 28 minutes (which included formatting the disks). Fastback Plus...

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Fastback Plus 2.0

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Fastback Plus has state-of-the-art backup features and such extras as a keystroke macro recorder and menu-selectable novice and advanced interfaces. The program is fast.

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HANDS ON

BY EDWARD MENDELSON

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**Fifth
Generation
SYSTEMS, INC.**

■ FORMS SOFTWARE

fields on forms you create yourself.

Printing forms is extremely time consuming if you are printing both form and data. *DisplayForm* sends the image to the printer with each record rather than downloading it as a macro and then just sending data. Deerfield Systems says this macro capability will be added to the program's next release.

Though *DisplayForm II* may be useful if you have a .PCX-compatible scanner and you primarily want to fill in large numbers of preprinted forms, it's not a sensible option if you plan to create your own forms. Also weighing against it are its poorly organized manual, its confusing user interface, its lack of on-line help, and its hefty price tag. Unless you need its special features, skip it in favor of the competition. —Robert Kendall

EZ-Forms Executive

EZ-Forms Executive presents an unkempt appearance. But the \$99 program from EZX Corp. proves that a program can have a few loose ends and still offer considerable value.

You encounter some of *EZ-Forms'* ragged edges when you open its package. I found five disks: three program disks, a "bonus" disk of form templates, and a demo version of the program that can be duplicated and passed around. An installation batch file handles most of the work of copying the files to your hard disk, but you still must do some steps by hand.

The main program disk is serialized, and you must install your name and address before the program will run. The manual unwisely saves half a page of paper by sending you back to the floppy disk instructions for this detail rather than listing it again. If you miss this step, the manual snidely sets you straight, editorializing that "this would represent a clear case study why following instructions is important." It makes an even stronger case for a better manual.

A number of documentation files are left on your hard disk after you finish installing the program. Some of them contain important update information, but others are simply advertisements for various add-on packages like template libraries and laser soft fonts. Surely these could be

EZ-Forms Executive takes advantage of pull-down menus and Alt-key combinations to make forms definition quick and easy. Tildes mark the areas to be protected from data entry on the final form.

combined into a single file, or even better still, put into the manual.

CHARACTER-BASED PROGRAM

This package is entirely character-based, relying on the IBM extended graphics characters to draw lines and boxes. The version we reviewed cannot do a lick of graphics, even on a laser printer, though the Laser Font Support Pack (due to be released with the next version of the software) should do so, according to EZX. Since the program does not support proportional fonts, you cannot use the large display fonts. It does support some unusual fonts created with line-draw characters, which are not particularly legible but which can add some impact to your forms.

Creating a master template is generally easy, and the software makes good use of pull-down menus and mnemonic Alt-key combinations to help you draw lines, enter and justify text, mark and move blocks, and add print attributes such as boldfacing or underlining. If you have a text file image of the form you want, such as a prototype you created in your word processor, you can import it into the forms design portion of the program and use it as the basis for your own form definition. I did this with one of the test forms and estimate that it saved me nearly an hour of work.

Defining the text and data areas on the form is quite straightforward. A single command will fill all spaces on the form with a tilde character, which protects those

areas from data entry. You can then erase the tildes and put spaces in their place wherever you want the data to be entered.

EZ-Forms supports calculated fields, but you must use convoluted spreadsheet-style formulas to define them, and you must explicitly request the calculations from a menu. You'll want to take careful notes before you go to the formula-definition screens.

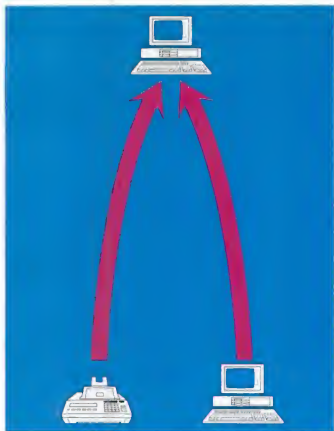
When you call up a form to fill it out, the display indicates where the data entry fields are located. You use the Tab key to move from field to field. The Enter key is

■ *EZ-Forms* represents an acceptable value for self-reliant types who are willing to work with its idiosyncrasies.

active, but it only moves the cursor to the first position on the next line. If this is not a data entry position, you will get a beep from your computer when you try to enter anything. *EZ-Forms* imports data from ASCII files, but only if each field is on a separate line, and only if the import records match the target form exactly.

Easy come.

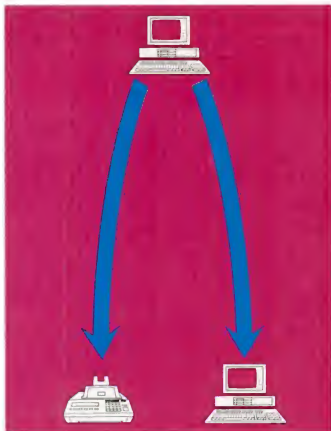
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FACT FILE



EZ-Forms Executive, Version 2.1
EZX Corp.
917 Oakgrove Dr.,
#101
Clear Lake, TX 77058
(713) 280-9900
(800) 873-2799 (for

credit card orders)

List Price: \$99; **Laser Font Support Pack,** Version 1.2, \$49; extra template libraries, \$99 (discounted if purchased with EZ-Forms).

Requires: 512K RAM, DOS 2.1 or later. Printer and hard disk recommended.

In Short: A low-cost, character-based package, *EZ-Forms* is uneven in execution, balancing attractive features with unappealing quirks. It's an acceptable value if you're willing to meet it halfway. Not copy protected.

CIRCLE 543 ON READER SERVICE CARD

UNPLEASANT SURPRISES Though the program is good enough at filling out its own forms, you'll have strange problems if you try to use a typewriter to fill out blank forms printed on a LaserJet. The program's LaserJet printer definition sets the line space to 6½ lines per inch, instead of the 6 lines per inch used by the typewriter. This allows the program to print a full 66-line form on the LaserJet's 60-line page. This is not mentioned in the manual, and you don't find this out until you measure the actual distances on your printed pages. You can change the driver if you wish, but you had better be prepared to deal with the arcane HP PCL commands, and in hexadecimal to boot!

Given its limitations, *EZ-Forms* did a passable job on the performance tests. It took about 2 minutes to resize the bottom box of the Purchase Order and less than 10 minutes to define the fields for automatic calculation.

According to the company, Version 2.2 (due to be released in April 1989) will significantly enhance the program's math, database-search, and data-export functions. It will cost \$119 and will require a hard disk and 640K of RAM. The Laser Font Support Pack, at \$99, will add 106 fonts, as well as supporting the LaserJet's graphics capabilities.

On balance, *EZ-Forms* consists of a mixed bag. Its lack of graphics, uneven documentation, and hidden quirks like the LaserJet line-spacing problem can make it frustrating to use. But on the other hand, it's fairly quick, inexpensive, and it is flexible despite its limitations. *EZ-Forms* represents an acceptable value for self-reliant types who are willing to work with its idiosyncrasies. —**Alfred Poor**

FormEasy

A complicated package, laden with menus, *FormEasy*, \$495 from Graphics Development International, produces adequate but not outstanding forms. Its real strength is in its superior data-handling capabilities.

FormEasy is a daunting program to learn. It makes extensive use of a deep structure of pop-up and pull-down menus, so locating the correct menu for a given function can be difficult. On-screen help is available, but often the screens do not contain enough information to resolve your questions. However, once you are comfortable with the program, you can use Ctrl and Alt commands to access deeper menus directly, speeding your use of the program. *FormEasy* supports a mouse, but it's not a necessity. You can use the program efficiently without one.

FormEasy displays its forms in text mode, so you won't see the correct sizes of your fonts on the screen. Instead, fonts of



FACT FILE



FormEasy, Version 4.0
Graphics Development
International Inc.
20A Pimentel Court,
Suite B
Novato, CA 94949
(415) 382-6600
List Price: \$495

Requires: 512K RAM, hard disk, DOS 2.0 or later.

In Short: *FormEasy* offers superior data-handling capabilities, but its complexity and relatively feeble graphics capability can make designing forms a chore. Not copy protected.

CIRCLE 544 ON READER SERVICE CARD

different sizes are shown in different colors. The software comes with 14 fonts from 6 to 14 points in size, of which you can use up to eight in any one form. The program supports LaserJet font cartridges, and includes a utility to help you customize cartridge fonts. It also supports PostScript printers and fonts.

The use of text mode hampers form creation because the screen positions of letters and graphics don't match their printed locations. *FormEasy*'s "actual mode" merely complicates matters. In this mode, the working cursor appears in color, while another cursor, shown in gray, tracks the approximate position of text on the printed

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FormEasy makes it easy to import data from dBASE or ASCII files—you simply number the fields. A preview function lets you see what the form will look like before you print it.

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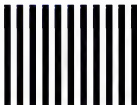
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HIGH-END FORMS PROCESSING: IMPRESSIVE POWER AT A HIGH PRICE

Electronic Form Systems (EFS) offers one of the most powerful—and pricey—PC-based forms-processing systems on the market. Buying into the EFS way of life costs anywhere from \$50,000 to \$500,000. But that hefty sum buys a sophisticated hardware and software system that you can use to create an intelligent form, put your company's logo on it, update it easily and inexpensively, distribute it, merge it with variable data from just about any host machine, and print it—with or without the data—on a laser printer. Although the EFS system is clearly more than the average PC user needs, it offers a glimpse of the state of the art in PC-based forms processing and points the way to the future.

The EFS system is aimed at organizations that depend on forms for their livelihood. For the mortgage banks, insurance companies, and accounting firms that make up the bulk of EFS's customer base, the path to profits is paved with paper—loan applications, insurance policies, and income tax forms.

In these industries, each business transaction creates a mountain of forms to be processed. A home-loan application, for example, generates an average of 35 forms, many of them with multiple pages. Because each application is different, the bank has to keep about 160 loan-processing forms on hand. And those forms must be updated constantly

to reflect new bank policies and changes in the secondary market.

STATE OF THE ART EFS offers an integrated set of products that address each step in the life cycle of a form. For creating forms, the company offers the Formcoder Workstation, a \$15,400 hardware/software package; the workstation is based on an IBM PS/2 Model 60 equipped with a Calcomp digital graphics tablet with four-button cursor, a Genius Micro Display System, and Formcoder software. (Printers are priced separately.) You can define fields and edit text using Formcoder's built-in word processor or any ASCII-based text editor. You can use the graphics tablet to digitize a printed form or create a new one from scratch. With the *E-Form Mapping* option, priced at \$5,750, you can add to the form such intelligent features as data alignment, data entry correction, and font selection. And if you don't want to do this yourself, EFS offers a slew of services, ranging from forms creation (at about \$150 per form) to digitization of logos and signatures.

Once the form has been created, the *E-Form* runtime module handles the data and lets you update the form itself. Priced at \$495, it runs on IBM-compatible ATs or PS/2s. Based on the map created with the *E-Form Mapping* option, the system rejects incorrect data, performs math cal-

culations, and carries data (such as addresses) and results (such as totals) to other blanks. EFS offers *Formdriver* software to help you to perform such management tasks as storing, copying, deleting, retrieving, and tracking the forms.

You can print the form with or without the data. EFS offers a wide range of Formwriter Page Printing Systems—from a \$4,000 8-page-per-minute (ppm) printer with a Ricoh engine to a \$26,595 20-ppm double-sided printer with a Canon LBT-20 engine. For paperless form viewing, EFS sells the Formviewer two-page display system for ATs and PS/2s, priced at \$3,995.

Since the data is stored separately from the form itself, it can be transferred easily to a database. The system can import and export files in the Lotus .WKS, .dBASE, .DBF, .DIF, .SDF, and ASCII formats. EFS also offers several communications options for interacting with micro and mainframe applications.

Although it is well outside the budgets of most PC users, the EFS system has impressive capabilities. As the category of forms-processing software matures, we hope to see more products offering some of these capabilities at lower prices.—Mary Kathleen Flynn

Mary Kathleen Flynn is an associate editor at PC Magazine.

page. *FormEasy*'s status display at the bottom of the screen indicates the cursor location in inches, centimeters, or points. It does not display graphics, so in practice, while it can help you lay out a simple form, it is of little use for complicated forms crowded with graphics elements and text.

SCALE TO FIT A better way of getting over this hurdle, recommended by the company's technical support people, is *FormEasy*'s global scaling function. When you turn this on, the form is dis-

played at a scale based on the size of the smallest font on the printed form. Everything else is drawn proportionally, which usually has the effect of showing the form much larger on the screen than it will appear when it is printed. Because only relative sizes are important, you can use the location registers for measuring the distances between elements on the form. When you've finished creating the form, you use a program function to scale it down to fit on one page.

If you want to use graphics elements in

your *FormEasy* forms, you must compose them in a separate graphics editor and then paste them over the text. The program draws lines and boxes in several line widths, circles, and columns. It also supports background shading. But it falls short on some of the more complex graphics elements such as boxes with curved corners.

The company claims that you can import files in two-color .PCX or Lotus .PIC format, but we were unable to get this to work in our tests. A company representa-

■ FORMS SOFTWARE

tive says that this part of the program is being "refined." Since the images are not merged with a form until it is printed, you can't see them on the work screen. But you can check their placement through the program's page preview function.

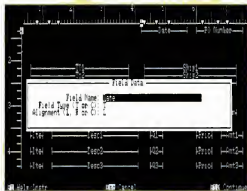
A WEALTH OF FEATURES *FormEasy* excels at importing and exporting text and numeric data from both comma-delimited or carriage-return-delimited ASCII files and dBASE files. Its design facilitates the job of locating and defining form fields that are to be filled with data. You can insert fields from an import file in any order on the form. You can calculate fields using the four basic math functions and by summing columns or rows. Additional features include field protection, limitation of the numerical values acceptable in a field, and the ability to set relations (comparisons) between dBASE files. For imported text, *FormEasy* controls the font and justification automatically, and you can make text appear either on a single line or inside a predefined box.

FormEasy supports two export formats: You can export an entire form as an ASCII text file. Or, if you want to use *FormEasy* to enter data, you can save the information in a dBASE file. Macro commands for use in batch files allow you to fill and print multiple forms in a batch and to send a form to your laser printer as an overlay.

For the user with a well-managed database, *FormEasy* is a good program for producing paper forms from your files. And the company intends to maintain this focus in future updates, fully integrating the program with dBASE III files. But its relatively poor graphics capabilities might send you elsewhere if your forms are at all complex. —Richard Lewit

FormsFile Form Finisher

These two products from Power Up Software Corp. have a different design philosophy from the one we assumed when we developed the performance tests for this project. The tests measure how well a program can match an existing form and then fill it out, but *FormsFile* and *Form Finisher*



When it comes to defining fields for data entry, *Form Finisher* offers few options. You can define a field as only text or as a constant and align it left, right, or center.

er are each designed to perform only a narrowly defined part of this process. So, although *Power Up* does not sell these two programs as a package, we combined them for this review. Not surprisingly, these programs did a poor job of duplicating both our simple and complex test forms. Nonetheless, there are still some good reasons to recommend them.

FormsFile and *Form Finisher* each come on a single diskette inside a small, wraparound folder that gives basic instructions for installing the program on a hard disk and starting it up. Once you start the program, the on-screen help facility gives the commands that will print out the documentation file, for which you will need sharp eyes. The manuals for both products are skimpy but do a passable job of explaining the programs' functions, and context-sensitive help often eliminates the need to refer to them.

AN ELECTRONIC FORMS CABINET

FormsFile is exactly what its name implies: a collection of blank forms that come as template files on disk. You will find examples of most commonly used business forms, including those used for accounting, scheduling, and miscellaneous office-management functions. The package also comes with a number of blank templates, but you cannot change the lines on the templates nor the location of the text; only the text itself can be changed. As a result, creating your own forms means searching for

the template that most closely matches your needs and then changing the text to the headings you want. Once you have made your changes, you save the template with a new name, leaving the old one intact.

Obviously, this is not a program you would use to recreate an existing form electronically. But if you need to create a new form and you do not want to spend your time agonizing over graphic arts and layout issues, then *FormsFile* just may fill the bill, or at least print the billing form. The package supports a wide range of dot matrix printers and does a good job with LaserJets as well.

Still, *FormsFile* could stand improvement in two areas. First, it lacks a printed directory of the available forms, so to find a suitable template, you have to go to the trouble of loading and printing each one individually to see what it looks like. This is an annoying inconvenience. Instead, you should be able to print all the templates in a one-time batch for use as a reference or, barring that, to find a list of the standard templates with a brief description of each in the manual.

Second, and more serious, the forms should be redesigned to use standard typewriter line spacing. According to a *Power Up* representative, the forms were designed to fit arbitrary graphics decisions. For example, the purchase-order template fits 21 lines in a 6 inch space. This looks nice, but it will give a typist fits, since the

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- Characters can be dragged until you see the exact spacing you want
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■ Fit Text to a Curve

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■ FORMS SOFTWARE



Forms Software: Summary of Features

(Products listed in ascending price order)

	Instant Pages \$49.95	FormaFile \$59.95	Form Finisher \$79.95	FormTool \$95.00	E2-Forms Executive \$99.00	FormWorx with Fill & File \$149.00	Polaris Forms \$149.00
INTERFACE							
Command mode	●	●	●	○	●	●	●
Graphics mode	○	○	○	●	○	○	○
WYSIWYG form creation	●	○	●	○	○	○	○
WYSIWYG form filling	●	○	○	○	●	○	○
DESIGN FEATURES							
Line drawing							
Rule thicknesses	None	N/A	N/A	Limited by printer	None	Determined by ASCII character set	.003 to 1 inch
Vertical lines	●	N/A	N/A	●	●	●	●
Patterned lines	●	N/A	N/A	●	●	●	●
Angled lines	○	N/A	N/A	○	○	○	○
Boxes with rounded corners	○	N/A	N/A	○	○	○	○
Lines drawn between characters	●	N/A	N/A	○	○	○	○
Arcs	○	N/A	N/A	○	○	○	○
Circles	○	N/A	N/A	○	○	○	○
Text							
Number of type styles supported	3	3	1	Limited by printer	1	14	Limited by printer
Number of fonts on a page	3	4	1	Limited by printer	1	14	16
Number of point sizes supported	3	4	1	Limited by printer	1	9	Limited by printer
Number of point sizes on a page	3	4	1	9	1	9	16
Can mix different fonts and point sizes on one line	●	○	○	●	○	●	●
Bold	●	○	○	●	●	●	●
Light	○	○	○	○	○	○	○
Italic	○	○	○	○	○	○	○
Underline	●	○	○	●	●	●	●
Reverse	○	○	○	○	○	○	○
Custom typeface generator	○	○	○	○	○	○	○
Vertical text	○	○	○	○	● (downward)	● (both directions)	● (both directions)
Justification							
Left	●	●	●	●	●	●	●
Center	●	●	●	●	●	●	●
Right	●	●	●	●	●	●	●
Proportional type							
Automatic offset of text in boxes	●	○	○	○	○	○	○
Mailing labels	○	○	○	○	○	○	○
Word wrap							
Special characters	○	○	○	○	○	○	○
Arrowhead	●	○	○	○	○	○	○
Check circle	●	○	○	○	○	○	○
Pointing hand	○	○	○	○	○	○	○
Small rectangle	○	○	○	○	○	○	○
Small square	○	○	○	○	○	○	○
Other	○	○	○	○	○	○	○
	ASCII, high-order IBM character set	None	None	Greek letters, math symbols, trademark symbol	None	None	Copyright and trademark symbols

●—Editor's Choice ●—Yes ○—No N/A—Not applicable (the product does not have this feature) *Features available with the Symbol Sheet Utility (\$49.95).

FormZ \$149.95	FormGen Plus \$189.00	FormSel \$189.95	Horizon \$195.00	PerFORM \$259.95	DisplayForm II \$495.00	FormEasy \$495.00	FormMaker II \$495.00	JetForm Design \$495.00	PowerForm \$495.00
●	●	●		○	●	●	○	●	●
●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●
None	1 to 14 points	.003 to .8 inches	.005 to .2 inch	.003 to .25 inch	1 to 72 points	5 to 7 points	1 point to full page size	Limited by printer	.25 point to full page size
●	●	●	●	●	●	●	●	●	●
○	○	●	●	●	●	●	●	●	●
○	○	●	○	●	●	○	●	●	●
○	○	○	○	○	●	●	○	●	○
1	Limited by printer	All LaserJet-compatible type styles	4	All Bitstream and LaserJet-compatible type styles	5	8	All LaserJet-compatible type styles	Limited by printer	33
1	6	Limited by printer	4	Limited by printer	5	8	Limited by printer	Limited by printer	33
1	54	Limited by printer	6	72	9	8	Limited by printer	Limited by printer	9,999
1	6	16	6	Limited by printer	9	8	Limited by printer	Limited by printer	Limited by printer
○	●	●	●	●	●	●	●	●	●
●	●	●	●	●	●	●	●	●	●
○	●	●	○	●	○	●	●	○	●
○	●	●	○	●	○	●	●	○	●
○	●	●	○	●	○	●	●	○	●
○	●	●	○	●	○	●	●	○	●
○	●	●	○	●	○	●	●	○	●
○	●	●	○	●	○	●	●	○	●
○	●	●	○	●	○	●	●	○	●
(both directions)	(downward)	(downward)	(both directions)	(downward)	(both directions)	(downward)	(both directions)	(downward)	(downward)
●	●	●	●	●	●	●	●	●	●
●	●	●	●	●	○	●	●	●	●
●	●	●	●	●	○	●	●	●	●
●	●	●	●	●	○	●	●	●	●
●	●	●	●	●	○	●	●	●	●
○	●	●	○	●	○	●	●	○	●
○	●	●	○	●	○	●	●	○	●
○	●	●	○	●	○	●	●	○	●
○	●	●	○	●	○	●	●	○	●
None	Bullet, check, solid circle	Bullet, check, circled numbers, copyright symbol, star	None	None	Over 100 symbols	None	Bullet, pointer, trademark symbol	None	Dingbats

(continues)

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Performance Comparisons using PC Labs Benchmark Series Release 4:

	NOP	80286 Instruction Mix	Floating Point Calculation	Conventional Memory
ZEOS 286/12 Desktop	2.81	4.78	18.84	0.72
IBM PC AT (8MHz)	4.23	8.96	35.60	1.32
IBM PS/2 Model 50	3.35	7.20	28.34	1.05

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	NOP	80386 Instruction Mix	Floating Point Calculation	Conventional Memory
ZEOS 386-16 Desktop	2.10	3.58	13.62	0.58
IBM PS/2 Model 70-E61	2.09	4.11	16.14	0.77
Compaq Deskpro 386/16	2.09	4.12	15.67	0.75



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■ FORMS SOFTWARE



Forms Software: Summary of Features

(Products listed in ascending price order)

	Instant Pages \$49.95	FormsFile \$59.95	Form Finisher \$79.95	FormTool \$95.00	EZ-Forms Executive \$99.00	FormWorx with Fill & File \$149.00	Polaris Forms \$149.00
DESIGN FEATURES							
Imports graphics	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	● (Free/ence, .TIF)
Displays graphics on-screen	N/A	N/A	N/A	N/A	N/A	N/A	<input type="checkbox"/>
Resizes graphics	N/A	N/A	N/A	N/A	N/A	N/A	<input type="checkbox"/>
Reorients graphics	N/A	N/A	N/A	N/A	N/A	N/A	<input type="checkbox"/>
Form sizes							
Letter	●	●	●	●	●	●	●
Legal	●	<input type="checkbox"/>	<input type="checkbox"/>	●	●	●	●
Ledger	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	●	●	<input type="checkbox"/>
Custom	<input type="checkbox"/>	<input type="checkbox"/>	●	●	●	●	<input type="checkbox"/>
Maximum form size (inches)	8.5 × 14	8.5 × 11	14 × 14	11 × 17	24.8 × 22	14 × 33	8.5 × 14
Adjustable gray scale	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●
Bar codes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	<input type="checkbox"/>	●
Multipart forms	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	●
DATA HANDLING							
File formats							
Imports	ASCII	None	None	ASCII text, de- limited ASCII, DBF, DIF	Fixed-length ASCII	Blank-delimited ASCII, comma-delimited ASCII, DBF, SDF	Comma- delimited ASCII
Exports	None	None	None	Delimited ASCII	None	Blank-delimited ASCII, comma-delimited ASCII, DBF, SDF	None
Data verification							
Verifies number (in number fields)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>
Verifies range values	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fields must be filled in before exiting form	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Additional field features							
Constant fields	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>
Protected fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	●	<input type="checkbox"/>
Duplicate information carried to following pages	●	<input type="checkbox"/>	●	<input type="checkbox"/>	●	●	<input type="checkbox"/>
Conditional tagging	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●
Automatic date entry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	●	●
Form can be time-stamped	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	●	●
Serial number can be assigned to a form	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	●	●
User-defined help can be linked to form fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Data box automatically resized on entry	●	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Automatic hyphenation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Moves between filled forms	●	<input type="checkbox"/>	●	●	●	●	<input type="checkbox"/>
Saves data separately from form	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	●	●	<input type="checkbox"/>
Allows multiple filled forms in one file	●	<input type="checkbox"/>	●	<input type="checkbox"/>	●	●	●
Supplies form templates	●	●	<input type="checkbox"/>	●	●	●	<input type="checkbox"/>
OPERATIONAL FEATURES							
Pull-down or pop-up menus	●	<input type="checkbox"/>	<input type="checkbox"/>	●	●	●	<input type="checkbox"/>
Context-sensitive help	<input type="checkbox"/>	●	●	●	●	●	<input type="checkbox"/>
Prints to screen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	●	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

●—Editor's Choice ●—Yes ○—No N/A—Not applicable (the product does not have this feature)

Some views on why the NEC MultiSync

There's a lot more to the new MultiSync® 3D monitor from NEC than meets the eye. Because instead of making one monitor for each



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Forms Software: Summary of Features

(Products listed in ascending price order)

	Instant Pages \$49.95	FormsFile \$59.95	Form Finisher \$79.95	FormTool \$95.00	EZ-Forms Executive \$99.00	FormWorx with Fill & File \$149.00	Polaris Forms \$149.00
OPERATIONAL FEATURES							
Graphics preview	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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Grids	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
In inches	<input checked="" type="radio"/>	N/A	N/A	<input checked="" type="radio"/>	N/A	N/A	<input checked="" type="radio"/>
In centimeters	<input type="radio"/>	N/A	N/A	<input type="radio"/>	N/A	N/A	<input type="radio"/>
In picas and points	<input type="radio"/>	N/A	N/A	<input type="radio"/>	N/A	N/A	<input type="radio"/>
Separate control of horizontal and vertical grid	<input type="radio"/>	N/A	N/A	<input checked="" type="radio"/>	N/A	N/A	<input type="radio"/>
Rulers	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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In centimeters	N/A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	N/A	N/A	N/A
In picas and points	N/A	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	N/A	N/A	N/A
Form elements							
Elements can be moved	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Elements can be duplicated	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Attributes can be changed	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Attributes can be stored	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
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Snap-to-grid function	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Pagination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
ALTERNATE INPUT DEVICES							
Mouse	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digitizing tablet	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
PRINTING							
Supports LaserJet family	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Can print data only	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Batch printing	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Form can be stored in printer for multiple printouts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Supports PostScript	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Supports downloadable laser fonts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Prints in landscape mode	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Prints in portrait mode	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Supports multiple printers	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Phototypesetters supported	None	None	None	LaserJet compatibles	None	None	LaserJet compatibles
DOCUMENTATION							
Tutorial	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Illustrations	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>
Glossary	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guide for setting up fonts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>

■ —Editor's Choice ● —Yes ○ —No N/A —Not applicable; the product does not have this feature.

PC									
FormZ \$149.95	FormGen Plus \$189.00	FormSet \$189.95	Horizon \$195.00	PerFORM \$259.95	DisplayForm II \$495.00	FormEasy \$495.00	FormMaker II \$495.00	JetForm Design \$495.00	PowerForm \$495.00
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FACT FILE



FormFile, Version B.01
Power Up Software Corp.
2929 Campus Dr.
San Mateo, CA 94403
(415) 345-5900
(800) 851-2917

(800) 223-1479 (in Calif.)

List Price: \$59.95

Requires: 256K RAM, supported graphics printer, DOS 2.0 or later.

CIRCLE 545 ON READER SERVICE CARD



Form Finisher, Version B.00
List Price: \$79.95
Requires: 256K RAM, supported graphics printer, DOS 2.0 or later.

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In Short: Within their limitations, these two products fill narrow and specific needs well enough. *FormFile* contains a storehouse of canned forms that you can print quickly and easily—but you can't change them much, and they are best filled in by hand. *Form Finisher* can be used to fill in just about any preprinted form, but it works best with dot matrix printers. Not copy protected.

lines do not fall on 1/6-inch spacings. As a result, the forms as they now stand are best filled out by hand.

FILL IN THE BLANKS *Form Finisher* also does only one thing—it fills in the blanks on preprinted forms. It offers no font control, no fractional line spacing, and no proportional character spacing. It uses standard 10-, 12-, or 16-pitch, and 6, 8, or 16 lines per inch. All you can do is tell it where the fields fall on the form and fill them in.

Power Up says that *Form Finisher* is designed for use with dot matrix printers, and you should take this limitation seriously. The program performed erratically with the HP LaserJet Series II printer used in our tests. Even the Power Up tech support people had difficulty getting one item to print on their LaserJet at all; hence we were unable to confirm or solve a problem

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found during our testing.

You define the fields on a WYSIWYG screen, naming each one and specifying whether it is a constant (text) or a variable. You then point on the screen to show how long the field should be. You can print a grid on a blank form: this can serve as a handy guide for laying out the fields. Power Up also sells an acetate grid for this same purpose through its Power Up! catalog. You can justify field contents flush left, flush right, or centered within the field space.

By contrast, you enter the data on a simple screen that displays one line per field. You can repeat the contents of the previous form to speed data entry. You can print the data right away or store it for later printing. *Form Finisher* has no facility to either import or export data from external files—you must type in all the information yourself.

Within its limits the program works well, although the field-layout process can get a bit tedious. Power Up should add support for calculated fields, which would eliminate many easily avoidable errors. The program could also use improvement in the way it copies blocks on the form definition. Currently, the copied fields all have the same names as the originals, and you must change each field name manually. This could be automated without too much trouble, and while the programmers are at it, they could make it possible to copy one line many times in a single pass, making it much easier to create columnar forms such as invoices.

As a result of their divergent design philosophies, these two programs really do not work well together. They fare better when considered for their individual merits, though they do have their quirks. *FormFile* is a no-fuss source for a wide range of typical forms, and it can be useful if you are just looking for forms that will be filled out by hand. Similarly, *Form Finisher* can be a handy tool if you need to fill out airbills and other simple forms on a dot matrix printer. —Alfred Poo

FormGen Plus

FormGen Plus is fast and powerful, but not inclined to hold you by the hand while you're discovering its functionality. It pre-



FACT FILE

FormGen Plus

FormGen Plus

FormGen Corp.
64 Healey Rd.
Bolton, Ontario
Canada L7E 5A4
(416) 857-4141
(800) 263-2390
List Price: \$189

Requires: 384K RAM, DOS 3.2 or later.
Hard disk recommended.

In Short: *FormGen Plus* is difficult to learn, but you can design forms rapidly once you've memorized its commands. Its use of text windows makes it difficult to position things exactly but greatly eases changing the form. It is fast and handles data entry well. Not copy protected.

CIRCLE 347 ON READER SERVICE CARD

sents a nearly blank work screen, with a flashing yellow cursor and the purple strip of a status line as its only adornments. To ferret out its real capabilities, you must read its manual thoroughly and commit some four dozen key combinations to memory. But once the commands begin to roll off your fingertips, you'll begin to discover the power of this program for designing almost any kind of form with a great deal of precision.

FormGen is a modular package. Design, data entry definition, and form filling run as separate programs: to change from one to another you must shuffle back and forth through the DOS prompt, a cumbersome procedure. But FormGen Corp. says it will soon change this to allow keystroke access to the different modules from within each program.

RAPID DESIGN Forms are mostly lines, and *FormGen* excels at drawing lines. The package can draw them character by character or in one swift, automatic motion. To draw a horizontal line, you simply position the cursor and press Alt-F1; this draws a line in both horizontal directions until it encounters a vertical line. Pressing Ctrl-F1 draws a vertical line in the same fashion. The process takes only a fraction of second.

FormGen has a number of other commands that speed the drawing of forms.

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In FormGen Plus, you can enter text and select fonts in pop-up windows rather than directly on the form. When text is entered through these windows, it is not displayed on-screen, but small triangles show where it's located.

For example, you can duplicate design elements automatically. If you have a mouse, you can simply drag the cursor across a box or a line to mark it, and then reposition it with the Alt-F3 key. You can duplicate a single character in a trail of cursor movements, automatically draw a form border, and use previously saved chunks from another form. *FormGen* will help you duplicate preprinted forms by printing a grid on top of them so that you can measure the exact field locations.

With so many timesaving techniques, you can outline a form in what seems to be no time at all. In fact, drawing the skeleton of the purchase-order form we used for testing took only about 8 minutes. Unfortunately, the process is complicated by the program's inability to show text in its true font style and point size on the screen.

A DIFFERENT KIND OF WINDOWS

In fact, you can't see most of the text at all. That's because most of the text is entered through pop-up windows. You're limited to 180 characters per window, and after you've entered the text the window disappears, leaving only a tiny pyramid behind to show where the text begins. You can print text right- or block-justified, and you can print it over one of three halftones. The number of text windows is limited by the amount of RAM. In a 640K system, the limit is 250 windows per form.

Logos and other illustrations are also placed in text windows, but only as file-

names referring to graphics files on-disk—you can't see them on the screen. A preview mode helps but does not eliminate this problem. A full-page preview screen in black on white indicates the approximate position of text in its true size, so you can see gross errors in text placement. But to fine-tune the form, you have to resort to trial and error—printing and adjusting the form until everything aligns properly.

Working with text windows can be awkward, but there's also an advantage. Since the text is kept separate from the boxes and lines on the form, you can change the size of a box or otherwise alter the form structure without affecting the text at all. So changing your form is fast and easy.

FILL IT WITH EASE *FormGen* supports a wide variety of different data entry fields. Numeric fields can be entered by the user or calculated from the contents of other fields. The program's math capabilities include exponents and percentages as well as the four basic functions. You can set up date and time fields for entry by the user or for automatic filling by the system. The program supports seven- or ten-digit phone fields, five- or nine-digit ZIP code fields, a number of formats for credit card numbers, two automatic serial-number fields, and a user-defined field format.

Once you've defined your form, filling it in is a straightforward process. By pressing the F8 key when you're at a field, the

system will repeat the data for that field on the previous form, a real timesaver on many types of forms. If you use the stand-alone version of *FormGen*'s form-filling module (*FormFill*), you can protect your forms from being altered accidentally.

FormGen comes with the *Glyphix* font generator from SWFTE International, which lets you create an unlimited number of fonts in a variety of point sizes and weights. For example, starting with the *Helvetica* font style, you can increase or decrease the point size, expand or compress the space between letters, control the degree of boldness or slant, and choose one of 12 fill patterns. You can also use fonts that come with the printer. However, you can use only six fonts in any one form.

FormGen is a fast and powerful program, but it's not easy to use. You have to learn a great many control keys and position your text through trial and error. It's also lacking in the fancier design elements such as circles, varying line widths, and halftones. Finally, the manual, upon which *FormGen* is so dependent, lacks illustrations and a thorough index; it also should be better organized. But if you are able to forego these niceties and put up with the program's unfriendliness, its capabilities won't disappoint you.

—Henry Fersko-Weiss

FormMaker II

FormMaker II is a program of contradictions. The \$495 package from FormMaker Software has a sophisticated system of counters that let you specify form components down to hundredths of an inch. Yet its form-filling features lack real definition. It has pop-up menus that can be moved around on the screen and it supports a highly sensitive mouse, but it falls back on function-key and Alt- or Ctrl-key combinations for important functions. It supports bar codes but not macros. And so on.

The design screen in *FormMaker* is a grid of white dots on a black background. Since forms can take hours to create with this package, this is not the most comfortable color combination to work with, especially if you're using a fine grid. The default grid is delineated in tenths of an inch horizontally and sixths of an inch vertical-

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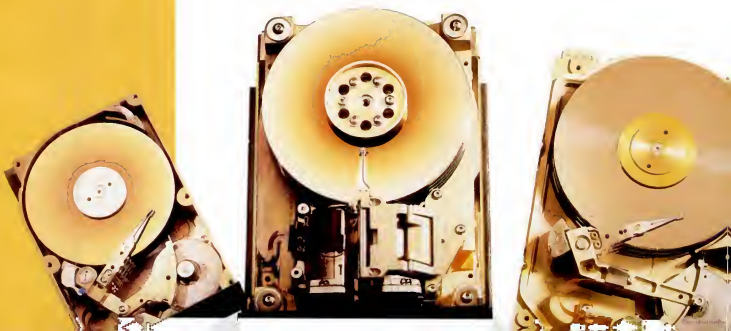
(714) 259-9555



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HOW THEY STACK UP: THE MANY FACES OF FORMS SOFTWARE

Though you can create usable forms with any of the packages we reviewed, there are significant differences in their design capabilities. The travel expense test form we created to put them through their paces has a good range of complex elements, including rounded boxes, vertical text, scanned images, shading, line widths, and laser typefaces. As you can see, the results varied widely.



PC LABS

TRAVEL EXPENSES

PC Magazine
Ziff-Davis Publishing Co.
One Park Avenue
New York, NY 10016

Name: _____

Expense Center: _____

Week of: _____

DATE	DEPT	TRIP PURPOSE	ROOM	MEALS	TRANSPORT	TOTAL
Sunday						
Monday						
Tuesday						
Wednesday						
Thursday						
Friday						
Saturday						
Totals						

INSTRUCTIONS:

- Complete middle section, listing each expense item separately. Receipts must be obtained for all expenses over \$10.00. DO NOT FILL IN THE SHADED AREAS.
- Fill in the amount advanced. Sign the form. Have the form signed by your manager and forward to accounting no later than 15 days from the last travel date.
- Complete top section including department, expense code, and purpose of trip. Expense centers **MUST** be specified for proper budget allocation.

Processing Checklist:

☐ Credit Card #
☐ Claimant's Signature
☐ Manager's Approval

☐ Entered in A/P system
☐ Reimbursement paid

MUST FILL

Prepaid Tickets: _____

Amount Advanced: _____

AMEX # _____

Signature: _____

Manager's Approval: _____

MUST FILL

FORM: EXP1.FRM



TRAVEL

PC Magazine
Ziff-Davis
One Park
New York

Day	City	Travel
Sunday		

DisplayForm II

	Misc	Total

FormWorx with Fill & File

INSTRUCTIONS:

- 1) Complete middle section, listing each expense item separately. Receipts must be obtained for all expenses over \$10.00. DO NOT FILL IN THE SHADED AREAS.
- 2) Fill in the amount advanced. Sign the form. Have the form signed by your manager and forward to accounting no later than 15 days from the last travel date.
- 3) Complete top section including department, expense code, and purpose of trip. Expense centers MUST be specified for proper budget allocation.

Processing Checklist:

- ☐ Credit Card # ☐ Entered in A/F system
☐ Claimant's Signature ☐ Reimbursement paid
☐ Manager's Approval

JetForm Design

If you have a laser printer, you'll want to make sure you can take advantage of its superior graphics capabilities. The limited resolution of DisplayForm II results in strange-looking fonts and causes jagged edges in the imported PC Labs logo. Its output makes quite a contrast with the attractive specimen from Per-FORM, which produces a much better-looking logo and handles laser fonts, shading, and variable line widths with aplomb.

Given a suitable collection of fonts and box-drawing characters, you can reproduce the basic design of the test form even with a text-mode package like FormWorx with Fill & File. But for multiple line weights and halftone shading, you need a more-capable package like FormGen Plus. In the FormGen Plus sample, different halftone patterns are used ably to distinguish the darker form headings from the lighter totals boxes.

The lower-left corner of the test form is a challenge, with its blocks of justified text, multiple fonts, and check circles. The most sophisticated design packages, such as JetForm Design, can duplicate the original almost exactly. But while Horizon and others fall short on such niceties as rounded boxes and multiple typefaces, you can still produce very attractive forms with them.



TRAVEL

PC Magazine
Ziff-Davis P
One Park
New York,

Day	City	Travel
Sunday		

Per-FORM

	Misc	Total

FormGen Plus

INSTRUCTIONS:

- 1) Complete middle section, listing each expense item separately. Receipts must be obtained for all expenses over \$10.00. DO NOT FILL IN THE SHADED AREAS.
- 2) Fill in the amount advanced. Sign the form. Have the form signed by your manager and forward to accounting no later than 15 days from the last travel date.
- 3) Complete top section including department, expense code, and purpose of trip. Expense centers MUST be specified for proper budget allocation.

Processing Checklist:

- ☐ Credit Card # ☐ Entered in A/F system
☐ Claimant's Signature ☐ Reimbursement paid
☐ Manager's Approval

FORM GEN PLUS

Horizon

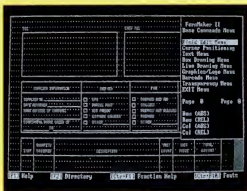
■ FORMS SOFTWARE

ly. A grid of tenths of an inch in each direction overloads the eyes and is as dazzling and confounding as George Bush's "thousand points of light."

Instead of rulers, the program has four position meters that appear at the bottom of the screen when the arrow cursor is active. The first two give the "absolute" row and column positions. The other two give you the "relative" position horizontally and vertically from the last cursor placement; this is useful because it can tell you the size of objects as you draw them.

You can set the meters to read in nine-tieths, hundredths, twelfths, or sixteenths of an inch, or in centimeters. However, their coordinates are displayed as two decimal numbers, and until you get used to this, the meter readings can be confusing. For example, with the default grid and meter settings (1/90 of an inch), the top-left dot reads as row 1.07 and column 1.01; the next dot down in the first column reads 3.04 on the absolute row meter. The decimals go up to .08 before they change over to the next whole digit, so the difference between the two rows is 15/90 of an inch, or 1/6—that is to say, one pic. Trying to think in 15/90 increments isn't easy.

DOUBLE PRECISION Knowing your position so accurately lets you design



While its display grid of white dots on a black background may not be the most comfortable color combination with which to work, FormMaker II's sophisticated system of counters allows for extremely precise forms design.

forms very precisely. But because the cursor has to be sensitive enough to move in these tiny steps (assuming the snap-to-grid function is turned off) it takes delicate, controlled hand movement. Otherwise, the cursor will shoot past the position you want. This can be frustrating, when you work near the edge of the screen, because if you inadvertently cross the boundary to the next area of the form, you have to wait for the screen to be redrawn.

Not surprisingly, *FormMaker* gives you very fine control over the thickness of lines and box borders. In fact, you can draw a line as thick as the length of your page.

When you draw objects, the cursor is locked into a straight line from its starting point, so you never have to worry about straying past the perpendicular. You can't draw circles, but the program comes with two circle logos of fixed size. You also get arrow and bullet logos pointing in the four directions, a registration symbol, and a few others. The program's duplication function makes drawing repetitive objects a snap.

Putting text on a form is a straightforward process. You simply mark the position where it will start, pick a font, and then enter it on a text-entry line at the bottom of the screen. As you type the text, it is displayed in normal text characters, so you can see letters clearly even if you are working with a small font. When you press the Enter key, the text shows up on your form

screen in its appropriate style and point size. *FormMaker* supports any Hewlett-Packard, PostScript, or Bitstream font.

One of *FormMaker's* drawbacks is that it doesn't have functions that center text vertically or align it with upper or lower corners of boxes. Without such functions, performing this feat takes a fair amount of figuring and cursor fiddling. Two levels of enlargement make it easier to see what you're doing. You can reduce the form image twice, the second reduction giving you a preview of what the full page will look like when printed.

FEW DATA ENTRY FUNCTIONS

FormMaker is most disappointing when it comes to data entry. You can define data fields only as either fixed—that is, they always have the same value—or variable. Variable data can be entered from the keyboard or merged in from an ASCII file, and you can control the order in which the fields are to be filled. But unfortunately the fields can't be protected, constrained, calculated, right-justified, or defined in any other way. However, *FormMaker* Software sells an add-on product called *Form Entry* that has sophisticated data-handling capabilities.

When you enter data from the keyboard, you can't see past the top third of the form, and if you're merging you don't see the form at all. You can, however, call it up later and see the top third. Forms must be compiled before they can accept data.



FACT FILE



**FormMaker II,
Version 3.2.2**
FormMaker Software
Inc.
57 S. Schillinger Rd.
Mobile, AL 36608
(205) 633-3676
List Price: \$495

Requires: 512K RAM; Hercules, CGA, EGA or other full-page monitor and adapter; HP LaserJet, PostScript, QMS, Xerox 4045 or 2700, C. Itoh 3000S laser printer; hard disk; DOS 2.1 or later. Microsoft mouse or compatible recommended.

In Short: *FormMaker II's* mouse sensitivity, precise positional counters, and WYSIWYG display let you design forms very precisely. But the program's eccentric and difficult user interface and limited data entry features diminish its usefulness. Not copy protected.

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and configure the
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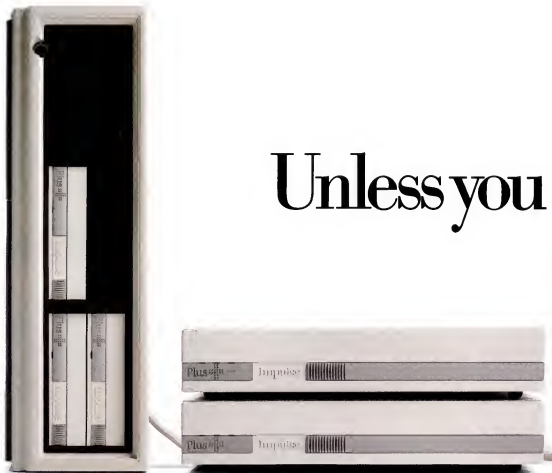
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know how to add.



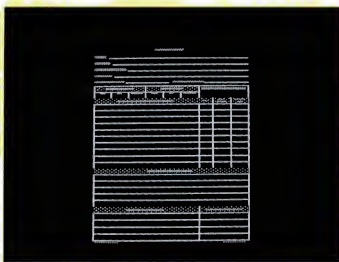
so that they're protected from both accidental and purposeful tampering by the person who enters the data.

FormMaker is a good design package that suffers from a weak data entry module. It is relatively easy to learn despite a manual that isn't well indexed or organized. It's also somewhat difficult to use, mainly because of the precision it gives you. You might say it's a collection of mixed blessings.—**Henry Fersko-Weiss**

FormSet

FormSet, from Orbit Enterprises, is basically a compiler that you use to create overlays on a Hewlett-Packard LaserJet printer. Technically, you don't use the \$189.95 program to design or fill in forms, but to process lists of design-command statements that you write using a word processing program. You exercise what little control you have over the program at the DOS prompt. There, you type slash commands that allow you to see the program statements, to list error messages, to compile a form, and so on.

Once the form has been compiled, you send it to your LaserJet printer, where it creates an overlay that will then print over any other job you send to it. Note that the program doesn't handle data entry at all: you must use another application program such as a word processor or a database to enter the information, position it on the



FormSet users must rely on a command language, rather than any graphical images, to design their forms; hence it can be rather difficult to visualize the finished product. Fortunately, a preview function gives you a rough outline.

form, and print it to the LaserJet. Naturally this can be a severe restriction for some end users. On the other hand, once the coded design has been compiled, you don't need *FormSet* to create the overlay.

The statements that you write to create forms with *FormSet* must conform to its syntax—a mix of command words, slash marks, colons, asterisks, ampersands, and positional coordinates of up to four decimal places. Working with commands rather than graphic images forces you to plan out your form—probably on paper—before you sit down at the computer and measure every line and box precisely. This turns form design into a slow, painstaking exercise in programming. Until you're completely fluent in the command language, it takes much longer to create a form by this method than it does with a graphical oriented program.

RICH IN FUNCTIONS Fortunately, *FormSet*'s command language is fairly rich in functionality, and it has a good system of error messages to save you time debugging your design code. The statements are quite English-like. For example, to draw a box, you type the word *box*; to draw lines you use the command *Horizontal* or *Vertical*. You establish the position of these elements by entering numerical coordinates.

For example, to draw a box, you must specify its upper-left and lower-right corners. The full command would look like

this: "box 0, 3, 40, 11," that is, a box with its upper-left corner at column 0, row 3 and its lower-right corner at column 40, row 11. The default grid is rules in tenths of an inch across and picas (sixths of an inch) down, so if you're using the default this box would be 8 picas long and 4 inches wide.

Drawing a line is similar, except that you must state the starting column and row followed by its length in columns or rows. The column and row numbers can be made to reflect tenths of an inch in each direction, quarters of an inch, twelfths of an inch, centimeters, millimeters—virtually anything between 1 dot and 1 inch.

Usually there are a number of approaches to programming a form, and naturally some are more efficient than others. For example, if you have a series of boxes that are all the same size you can define each one as a single item or, using just a few commands, enter a procedure that will create the whole series. In the travel expense form we used for testing, there was a vertical group of boxes for the days of the week. Programming each box independently would take 14 lines of code. But using the "dupprocedure" and associated commands, it took only 8 lines.

Similarly, you can increment the coordinates of each succeeding design element, offset whole portions of a form, or use subroutines. Of course, these more sophisticated programming techniques are harder to learn. In *FormSet*'s syntax, text



FACT FILE



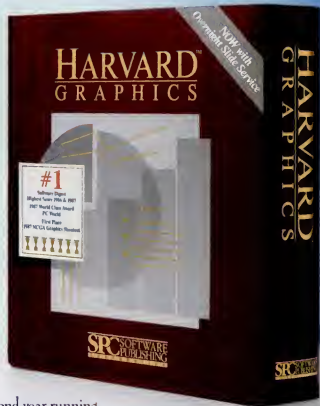
FormSet, Version 2.0
Orbit Enterprises Inc.
P.O. Box 2875
Glen Ellyn, IL 60138
(312) 469-3405
List Price: \$189.95
Requires: 512K RAM,
DOS 2.1 or later. Hard

disk recommended.

In Short: *FormSet*'s compiler approach makes form design a slow process, although the program's excellent error messages and its preview mode help somewhat, and printing is fast. But you'll have to rely on your database or other program for filling in the forms. Not copy protected.

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the second year running.

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■ FORMS SOFTWARE

that will appear on the form must be delimited by slash marks on the command line. You can use any font supported by the LaserJet. The number of fonts you can use on a form depends only on the maximum number your printer supports on a single page.

MESSAGES MAKE A DIFFERENCE

It's pretty difficult to visualize your finished form just from looking at the instructions you've created to produce it. Fortunately, *FormSet* has a preview function that lets you see the basic outline of your form in neon blue on black. To get this view, you have to exit your word processor and return to DOS.

If, upon viewing your form, something looks askew, you can usually locate the problem by checking the error and warning messages *FormSet* generates. If you display your form file on the screen, these messages appear as lines in a different intensity or color, depending on the screen. The messages are also printed to a disk file that you can call up at the DOS prompt. There are 109 very specific messages. They make debugging a form file much easier than if you had to find the errors by scrutinizing each line.

There is something backward about creating a form, which is essentially graphic, by using only commands. You can't just sit down in front of the screen and do a quick form design; everything must be thought out carefully beforehand. But if you need a program that creates overlays and you're content to rely on your database for the data entry features *FormSet* lacks, the program could be your best bet. *FormSet* makes the most of the possibilities of the compiler approach. Its understandable commands, sophisticated programming features, and comprehensive error messages take some of the sting out of an inevitably time-consuming job.—Henry Fersko-Weiss

FormTool

Block Publishing Corp. has no pretensions about its *FormTool*. The company admits that the \$95 program won't design fancy forms or perform sophisticated data entry. Its raison d'être is to produce basic forms quickly, with an emphasis on utility.

The screenshot shows the FormTool interface with a menu bar at the top: [F2] List [F3] Get Record [F4] Start Record [F5] File Conversions [F6] Setup [F7] View Form and Merge Fields [F8] Merge Menu [Esc] Exit. Below the menu is a form titled 'PURCHASER INFORMATION' and 'SHIP VIA'. The form contains fields for 'SUPPLIER NO.', 'DATE REQUIRED', 'MARK OUTSIDE OF CARTONS', 'CONFIRMING PHONE ORDER OF', 'QUANTITY ORDERED', 'ITEM', and 'DESCRIPTION'. The form is displayed in a neon blue on black style.

The data entry fields in *FormTool* are indicated by pink bars. You can enter information in any order by numbering the fields, as shown here.

FormTool lives up to its mission forthrightly. You can use it to lay out a form in less time than it takes to draw a couple of boxes by hand. You do everything by pressing function keys or two-key combinations or by making selections on pop-up menus. The program is reasonably easy to learn, and you can get help or a list of all the commands on the screen at any time.

FormTool's main work screen is bordered at the top and the left side by column and row numbers. A status line at the very top of the screen tells you your exact row and column coordinates. Working with whole numbers that represent a raw position in this way is conceptually easier than converting decimal numbers into fractions of inches or thinking in tenths and twelfths of inches.

The row and column numbers never change, but you can change the way they are translated into horizontal and vertical measurements by changing the settings for characters per inch and lines per inch. This is important because *FormTool* is a character-based program that doesn't show the true fonts on the screen.

MAKING IT FIT To get the relative size of text fonts and boxes to match, you may have to change the settings. For example, a box near the top of our purchase order had a field title 25 characters long. If *FormTool* was left at the default setting of 10 characters per inch, the title ran past the right side of the box and overwrote part of

the next box. But when the cpi setting was changed to 17, the box was resized accordingly and the form came out fine.

The example above reveals one of the headaches of using *FormTool*—you have to play with your form-design and measurement settings to achieve a good alignment. This is especially true when you start to use large fonts: their placement on the form is something of a mystery until you print it. In most cases, you'll have to print a few test forms and make adjustments to get the final form into shape.

Once you're familiar with the drawing facilities, a little forethought will let you lay out a form very quickly. We were able



FACT FILE

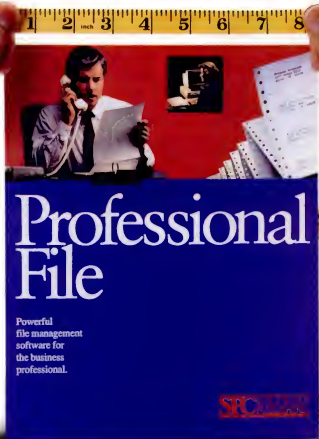


FormTool, Version 2.1
Block Publishing Corp.
800 SW 37th Ave.,
#765
Coral Gables, FL 33134
(305) 445-0903
(800) 888-2562
List Price: \$95

Requires: 256K RAM, DOS 2.1 or later.
In Short: *FormTool* won't let you design fancy forms, and its data entry features are minimal (though it does import dBASE files). But if your needs are basic, its simple, clean design makes it quick to learn and use, and it comes at a bargain price. Not copy protected.

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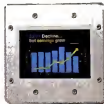
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■ FORMS SOFTWARE

to draw our purchase-order form, for example, in 6 minutes. Lines and boxes are very easy to draw and erase. Pressing F7 draws a horizontal line from the cursor to the next vertical line or to the right edge of the form, while pressing F8 erases a horizontal line at the cursor. You draw vertical lines using the F5 and F6 keys.

Furthermore, you can draw boxes either as individual units or as grids of squares or rectangles. The ability to draw any size grid, with as many components as you want, is quite a powerful feature. Just by responding to four simple prompts, you can instantly draw an entire honeycomb of boxes. Or you can create a series of lines simply by erasing the outermost side borders of a one-column grid.

BASIC ABILITIES The same ease that characterizes *FormTool's* drawing facilities carries over to its text-handling abilities. You can set the font characteristics for whole blocks of text, lines, or individual characters with just a few keystrokes. Justification can function across lines or grids of boxes, too. Unfortunately, these text attributes are assigned to positions on the form, so if you move the text afterwards, the attributes don't move with it.

Data entry in *FormTool* is very basic. You can justify the data in the fields, but that's about the only thing you can do—you can't verify numbers, protect fields, use conditional tagging, or calculate anything. You can't even generate an automatic date or time from the system. *FormTool* can merge information into your form in any order, from dBASE and dBASE II files as well as from comma-delimited ASCII files. It can also export the data on a form, but only when such data in comma-delimited ASCII format.

A couple of special features give *FormTool* the feel of a program of some pretension. You can open up to four active forms at the same time in windows. You can size and position the windows, and you can cut and paste blocks between them. In addition, a handy form "organizer" helps you keep track of your forms and can even search by several criteria, such as size and date of last update.

With its quick and easy design techniques and its special features, *FormTool* is more than it seems at first. Yet it stays

true to its mission as a basic program. You can't draw circles or arcs, use halftones, import graphics, or see font styles on the screen, and the data entry facilities allow only the simplest field definition. But, if the forms you create don't have to represent your corporate image and your data needs are plain, then this product may be just right.—Henry Fersko-Weiss

FormWorx with Fill & File

FormWorx with Fill & File lets you create forms on-screen and then fill them out with the aid of powerful database functions. This \$149 program from FormWorx Corp., works only in text mode. This is both its main strength and its biggest weakness.

Getting started with *FormWorx* is much easier than with most graphics-based forms packages, and it allows you to cook up simple forms much faster. Moving or deleting elements is a straightforward process, not subject to the inevitable quirks of graphics-mode operation. And, of course, its text files print much more quickly than graphics files.

FormWorx's editing tools make it easy to create boxes, lines, and fill patterns using the ASCII graphics characters. You can turn on word wrap or center text within a selected area. But you can't resize or align selected elements or make propor-



FACT FILE



FormWorx with Fill & File, Version 2.5
FormWorx Corp.
Reservoir Place
1601 Trapezo Rd.
Waltham, MA 02154
(617) 890-4499
(800) 992-0085

List Price: *FormWorx with Fill & File*, \$149; *FormWorx*, \$95.

Requires: 512K RAM, two disk drives, DOS 2.0 or later.

In Short: *FormWorx's* chief assets are its powerful data entry and database functions. It runs strictly in text mode, so it can't handle fancy graphics, but if your forms are relatively simple, *FormWorx* does the job with aplomb. Not copy-protected.

CIRCLE 66 ON READER SERVICE CARD

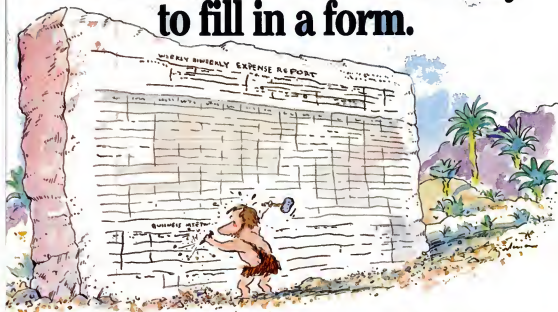
tions equal automatically. Nor can you create visual flourishes such as diagonal lines, background shading, boxes with rounded corners, and lines of several different thicknesses.

You also cannot directly import graphics images into a form. The best you can do is to create an overlay on your LaserJet with the image you want to print on it. The manual has some guidelines on how to do this, but it's not an easy process, and converting .PCX files to the format required by the Hewlett-Packard command lan-



The box-drawing feature in *FormWorx* is easy to use. You simply select the type of line you want to use and then size the box with the cursor.

It shouldn't take a whole day to fill in a form.



Ever since people have been doing business, filling in forms has been time consuming and frustrating. Now, using **FormWorx with Fill & File™**, you can finally get your forms processing out of the stone age.

Quickly Fill In Standard Forms. **FormWorx with Fill & File** makes it easy to fill in any standard government and industry form. After creating an on-screen version of your form, simply tab from blank to blank and type in your data. Correct any typos before printing and get letter-perfect results every time. Entries print precisely where they belong on your original form!

Some of the many powerful features: date and serial number stamps to minimize typing. Lookup tables to automatically fill in data. Read-only fields to prevent inadvertent changes. Autocopy fields to repeat data in different parts of a form. "Ditto" to repeat information from previous records. **Fill & File** will even perform extensive calculations automatically to eliminate the possibility of math errors.

Efficiently Create And Fill In Custom Forms. **FormWorx with Fill & File** actually contains the latest version of **FormWorx®** the easiest forms designer available, so you can make and

fill in any form using just one package! There's no need to purchase a separate forms design tool.

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When you fill in a form, **Fill & File** simultaneously creates a standard database to store your information. **Fill & File** reads and writes dBASE® files directly—without file conversion. Different forms can be linked together. Your data can be selectively retrieved and automatically transferred to fill in other forms...not just the one originally filled in. Other features include: import/export ASCII and other file formats, long text fields up to 4,000 characters, multiple data files for relational capability, search and locate functions and batch printing. No need for all those cumbersome file cabinets cluttering your office!

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800-992-0085 or 617-890-4499

FormWorx
CORPORATION

Reservoir Place, 1601 Trapeze Road, Waltham, MA 02154



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Specifications MPC4000F	
MIPS	5.8
CPU	80386-25
CACHE	32KB
RAM	16MB
EXP. SLOTS	7
DEVICE SPACES	6
POWER	225 W



mitac

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—Rock Wright
TELEPHONE

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■ FORMS SOFTWARE

guage requires a separate utility program.

The version of *FormWorx* we tested didn't come with soft fonts, although the vendor says it plans to add these to the product's next release. *FormWorx* does let you mix different cartridge fonts in a form, but you must first call up a configuration menu and enter the printer control codes that turn these fonts on and off. Another drawback: since all fonts are the same size on-screen, positioning them can be tricky.

FormWorx's lack of WYSIWYG representation forces you to scroll a form on the screen to see it all, and that can make it difficult to judge its proportions properly. This problem is aggravated if you use the program's horizontal or vertical print-compression options, which let you use a small font to squeeze a detailed form onto a single page or draw horizontal lines that come right to the upper or lower edge of text (useful for underlining fill-in fields). Since these options don't change the appearance of your form on-screen, you must work with an elongated or widened version of what actually prints out.

DATABASE POWER *FormWorx* is most capable when it comes to filling in your forms. To attach database fields to the forms you create, you simply use the cursor to position and size each field on the form. You can move through the fields on the form in any order, and you can select data verification options from a menu. Menu options let you fill the current field with the system date or time, carry a value over from the previous record, increment a serial number, or calculate a field from the values in other fields.

Each time you fill the form in, you collect and store the data as a record in a dBASE-compatible file, which can hold up to 32,000 records. The program can also import and export ASCII data files. You can view or print records according to selection criteria, which can include range specifications and Boolean operators. You can even create a link to a second database file or select user-defined field values from a lookup table. This allows you, for example, to check the address and other related information automatically when you enter a name on the form.

Unfortunately, there are some rather nasty facets to *FormWorx*'s data-handling

methods. For example, the program does not prevent you from creating invalid fields, and it's all too easy to end up with unexpected results when you're changing the database structure.

FOR THE POWER USER The program is not easy to install. In fact, the difficulty involved in configuring the printer options and setting up a database with *FormWorx* will probably prove too much for the average office worker. The vendor expects that a systems expert will handle the more-technical aspects of installation. The company has accordingly included a powerful script language with the package, allowing you to create custom menus with user-defined prompts for each selection.

With its powerful database features, *FormWorx* is an efficient way to turn large quantities of data into filled-out forms. It can be relatively quick and easy for designing simple forms, and it's certainly capable of very attractive output. But for graphical sophistication and WYSIWYG display, you'll have to look elsewhere—or wait for the forthcoming *Microsoft Windows*-based version of *FormWorx*.

—Robert Kendall

FormZ

Like the blind men with the elephant, software publishers have very different views of what a forms program should do. The folks at North Winds have managed to give life to their unique vision in a \$149.95 package called *FormZ*.

FormZ is not a good choice if you need to perform the full range of tasks in our tests. It is entirely character-based, so you can draw lines only by using the PC's line-drawing characters. It doesn't handle the other high-order ASCII characters, so you can't even create crude arrowheads or check boxes. You cannot import graphics, use different laser fonts, or make rounded boxes. It is not well suited for use with laser printers, and its best features are available only through dot matrix printers.

So what is good about *FormZ*? The fact is that it is designed to fill in preprinted forms on a dot matrix or daisywheel printer, and it does this very well. Like other programs, you define a template first, with

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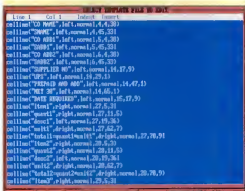
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City _____ State _____ Zip _____ Phone _____

■ FORMS SOFTWARE



FormZ offers some powerful utilities, including a full-screen editor that you can use to modify the template files directly once you've created the forms on-screen.

blank fields that will later be used for data entry, and fill in the screen with prompts and lines.

But *FormZ* gives you a level of control that is rather special for a character-based program. For example, you can define a text field to be centered or left- or right-justified. You can give a numeric field any one of ten different formats. You can specify that a field be typed a half line up or down. And you can use five-function math to calculate a field's value by referring to the other field names.

Better still, if you are using a printer that controls its printhead one character at a time (most daisywheels can do this), you can move the printhead around the page by moving your cursor on the screen, and so use a preprinted form as your model. This offers a unique alternative to the rulers, grids, and scratch-pad calculations you need to lay out templates with other form programs.

You may not even need to create a template at all. North Winds supplies some samples with the program, and you can purchase dozens more for such items as courier service airbills. Templates are available for accounting forms from nearly every major forms printer, and North Winds offers a wide range of templates for specific industries.

Filling in your forms is also easy—you enter one form on-screen at a time and either print it then or save it for later. Once printed, the forms data is stored in a "li-

brary" that you can use to recall information later. You can search your forms libraries for a certain word; for example, you can use an internal library to recall a name and an address and place them in the correct fields on a blank invoice template.

SLICK LOOKUP FEATURES *FormZ* is also reasonably good at recalling information stored in *Lotus 1-2-3* or *dBASE* files. Though you cannot create a batch of forms in a single pass from these types of files, you can use the 1-2-3 worksheet feature to scroll through the available names and select the information you want. You can also use it to look up information in a worksheet based on an item in your form;



FACT FILE

FormZ, Version 2.1
North Winds
P.O. Box 671
1 Northgate 2 Garden
Center
Greensburg, PA 15601
(412) 832-9799
List Price: \$149.95

Requires: 512K RAM, DOS 2.0 or later.
Hard disk recommended.

In Short: *FormZ* offers some powerful features for filling out preprinted forms on dot matrix and daisy-wheel printers. But it's not good for much else. Not copy protected.

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DATACARE

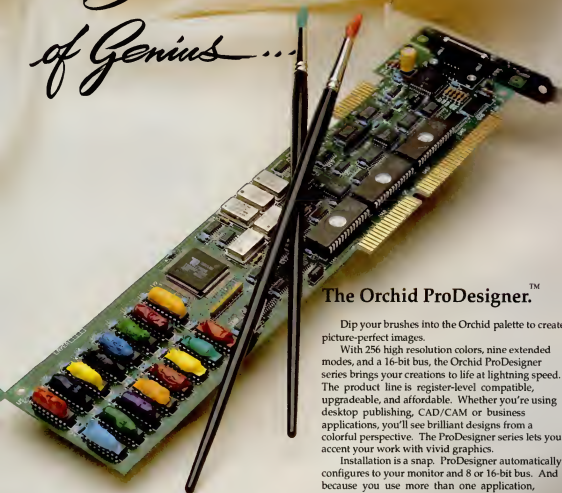
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Features	ProDesigner VGA Plus	ProDesigner VGA	Designer 800 VGA
Bus & BIOS Support	16 and 8 Bit	16 and 8 Bit	8 Bit
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640x350 256 colors	Yes	With User Upgrade	With User Upgrade
640x480 256 colors	Yes	With User Upgrade	With User Upgrade
800x600 16 colors*	Yes	Yes	Yes
800x600 256 colors*	Yes	With User Upgrade	With User Upgrade
1024x768 16 colors*	Yes	With User Upgrade	No
3 - 132 columns 16 color modes	Yes	Yes	Yes
100% Register and BIOS Compatible with VGA, MCGA, EGA, CGA, MDA and Hercules	Yes	Yes	Yes
Auto Mode Switch, Auto 8/16 Bit Sense and Auto Monitor Select	Yes	Yes	No
Suggested Retail Price	\$599	\$499	\$399

* Supports these standards on both interlaced (IBM 8514 and compatibles)
and non-interlaced (NEC Multisync XL and compatibles) monitors.

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CIRCLE 190 ON READER SERVICE CARD

■ FORMS SOFTWARE

for example, the description and unit price of an item based on its part number. Similarly, you can reference the fields directly to cells in a *Lotus* worksheet and retrieve the contents automatically.

The package's full set of mathematical, string, and logic functions allows you to do some sophisticated programming. Just as the libraries store information about a single form, you can use the package's "ac-

■ A weak competitor in most other areas, *FormZ* has a lot to offer those who fill out preprinted forms on a dot matrix or daisy wheel printer.

cumulating cells" to create records of the data in certain fields on all forms over a given period, based on a template. For example, you could report the clients and totals for all the invoices you wrote in a given week. According to North Winds, some *FormZ* users have been able to build rather complex accounting systems based on this feature.

For even more flexibility, you can edit the "code" that defines a template using the program's full-screen editor. This is a powerful addition to the "painting" approach normally used for defining templates. The editor offers a full set of search-and-block functions, so you can quickly modify a template or create a new one based on it. But you need to be comfortable with row/column coordinates to make use of this facility effectively.

So where does *FormZ* stand against the competition? For creating forms on blank paper and for working with page printers, it is a weak competitor. For merging large quantities of data to create many forms, such as monthly statements or invoices, it does not do as well as some others. But if your work is mostly filling out preprinted forms on a dot matrix or daisywheel printer, *FormZ* has a lot to offer. —**Alfred Poor**

Horizon

Horizon, from FormMaker Software, falls in the middle of the pack of products reviewed in this issue. Its list price of \$195 puts it well above the low-cost options but well below the high-priced products. The question is, is it stuck in the middle? Or does it challenge both ends at once?

At first glance, *Horizon* shows real promise. *Horizon* is a graphics-based WYSIWYG program that runs under *Microsoft Windows*. (A runtime version comes free with the *Horizon* package, which you can use if you don't have *Windows* installed on your system.) It is a typical *Windows* application, with pull-down menus that give you access to files, fonts, and other useful features. Like a paint program, *Horizon* has a toolbox that you can use to select the different editing modes by clicking on one of 12 different icons. If the toolbox is in your way, you can easily slide it to a different part of the screen.

The toolbox makes it easy to draw the frames that will hold your form's data and to divide larger frames into two or more smaller ones. You can make one division at a time or create a whole grid. For example, if you have a large area on an invoice form that you wish to fill with evenly



FACT FILE



Horizon, Version 1.1a
FormMaker Software
Inc.
57 South Schilling Rd.
Mobile, AL 36648
(800) 888-8423
(205) 633-3676
List Price: \$195

Requires: 640K RAM; IBM PC XT, AT, PS/2, or compatible; one floppy disk drive and one hard disk; Hercules or better graphics display and adapter supported by *Microsoft Windows*; *Windows*-supported graphics printer; DOS 2.1 or later. *Windows*-supported mouse recommended.

In Short: Despite a few weaknesses, particularly in data handling, *Horizon* packs a lot of performance for its relatively low price. It can be a good value if you want more design finesse than a character-based program can offer. Not copy protected.

CIRCLE 603 ON READER SERVICE CARD

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—Ted Robinson
TELEPHONICS CORP.

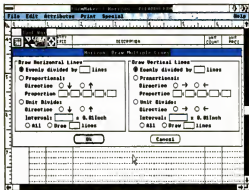


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■ FORMS SOFTWARE



Horizon's Multiple Line Tool makes short work of the tedious task of laying out the areas of a form and dividing them into equal sections.

spaced horizontal lines, you can do so in one step and at the same time divide the frame into a specified number of vertical sections.

After you have defined the various frames, you define the data fields. You can place them one at a time or create a large batch of related fields in one pass (such as a column of unit prices on an invoice form). You can justify the data left, right, or centered. You can place text anywhere on the form, changing the font attributes or editing the text. You cannot calculate field values from other fields, however.

ADEPT AT FONTS AND GRAPHICS

Horizon also makes it easy to produce attractive-looking forms. It comes with a good batch of Hewlett-Packard LaserJet soft fonts, which it uses effortlessly. You do not have to worry about downloading the fonts—the program takes care of that for you. *Horizon* also comes with plenty of line-drawing and editing options, including settings that make sure two lines will meet at the same point. You have lots of control over line width, and you can fill frames with different patterns and levels of halftone screens. But you cannot put rounded corners on boxes easily, and there is no provision for special characters like arrowheads or check circles.

To put pictures on your forms, you can import graphics files in either .PCX or .TIF format. This works well, though you may find that .PCX files are too large to fit

on your screen because *Horizon* maintains the pixel-per-dot resolution of the image. You can get around this problem by shrinking the image. In our tests, we used VS Software's *SLED* utility to shrink an image to 20 percent of its original size so that *Horizon* could accept it.

Since *Horizon* downloads a form to the HP LaserJet as an overlay, batch form printing is fast. The program comes with a number of handy document-control features, including author's name and comments, and you can even password-protect your forms. If you are upgrading from a character-based forms program, you can import an ASCII text image of the form and convert it to *Horizon* format, which is often faster and easier than recreating the form from scratch.

ONE BY ONE When it comes to data entry, *Horizon* is a little unusual. Instead of entering the information directly on the form, you enter it in a separate window that presents the data fields one at a time. You'll see the prompts you defined when the form was created, so it should be fairly simple to keep track of your place. But since *Horizon* is not a full-screen data entry system, it is difficult to jump around from field to field.

Horizon works better when you merge in your data from another application. The program accepts ASCII files in three formats: field per line, comma delimited, and fixed length. (There is also a provision for

specifying your own delimiter.)

Unfortunately, the program does not refer to the formats in this manner. The field-per-line format is called *WordStar* (No-Doc); the comma-delimited format is called *dBASE*, and the fixed-length format is referred to as a *Lotus .PRN* file. The manual has sketchy instructions for creating these formats from their respective programs. The *Lotus* format has some hidden pitfalls, but the other two work reliably as long as you follow the directions carefully.

Other flaws are more significant. *Horizon* has no snap-to-grid feature to help you align the elements of a form. Worse, the program does not give you a magnified view that would make it easier to align the elements by eye. According to a Form-Maker representative, both of these features are scheduled to be included in the program's next release. This should improve the package considerably.

Though the manual is generally well written, it is uneven in quality. It refers to program menu choices by different names and uses conflicting terms in different

■ *Horizon* makes it easy to produce attractive forms. The package contains a good batch of LaserJet soft fonts and plenty of editing tools.

chapters. For example, the "Box Dividing Tool" of chapter 6 becomes the "Frame Dividing Tool" in the chapter 12 tutorial. And neither term is listed in the index, which is confusing and incomplete. Illustrations are plentiful, but some important topics (such as how to import *Lotus .PRN* files) are glossed over.

In the final analysis, *Horizon* represents a relatively good value for its midrange price. It is capable of producing attractive forms fairly quickly and offers ample data import and export capabilities, though the

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Finding a way to make a printer with laser quality, but without laser cost, was no easy task. So when Canon engineers designed the BJ-130, they were quite surprised to find such a simple answer. Bubbles. Millions of tiny ink bubbles, in fact, that quickly and quietly print at up to 360 DPI for performance that's almost unheard of in a non-impact printer.

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Canon
BJ-130
Bubble-Jet Printer

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For more information, call the Bubble-Jet Hot Line 1-800-453-7000

CIRCLE 471 ON READER SERVICE CARD

■ FORMS SOFTWARE

value of these features is blunted by poor documentation. If you need more than a character-based forms package, and if you intend to get most of your forms data from a database, then *Horizon* is well worth your consideration as an alternative to more-expensive products.—**Alfred Poor**

Instant Pages

Instant Pages, a \$49.95 program from Electronic Arts, is surprisingly versatile, especially when you consider that it is entirely character based and relies on the IBM line-drawing characters for such graphics as it can muster. Besides creating and filling in forms, it can stretch to cover organization charts, calendars, and even multicolumn newsletters.

Installation is a snap. The program supports a Logitech or Microsoft mouse, although you have to run the mouse menu program first. Though not required, a mouse makes it far easier to navigate around your workspace and gives you fast access to the pull-down menus.

Instant Pages comes with nine tutorial files that give you a tour of the program's fundamental features. They are simply form templates with instructions and exercises that you perform on-screen.

With *Instant Pages*, there is no real difference between creating a form and filling one out. You can import text from other files, but only into a single frame at a time.



Unlike most forms programs, *Instant Pages* uses the same screen for creating and filling in forms. You can program the function keys to insert graphics characters for creating lines and boxes.

This is fine for a newsletter, but it was of little use in our test forms. Forms can be a maximum of four pages long (fewer if you have less than 640K of memory). If you need forms with more pages, you must split them up into separate files.

A SNAP TO USE Drawing lines, entering and formatting text, and performing block operations is quite easy. It took less than 3 minutes to make the test task adjustments to the boxes at the bottom of the sample purchase order. To create special characters like arrowheads and circles, you can assign the appropriate ASCII graphics characters to the Ctrl-function key combinations. It does not support calculated fields.

The manual is a thin, saddle-stapled booklet that offers good information and an index but precious few screen shots or examples. The help screens are quite good, and I often found myself turning to them before trying the manual. One nice aspect of the manual is that it contains thumbnail pictures of all the sample templates included on the disk.

Admittedly, this program lacks a number of features that many users would be unwilling to do without. Though it works well with laser printers and even offers the option of squeezing 66 lines into the 60 printable spaces on a laser page, it does not support proportional fonts or graphics; in fact, it does not even support the Line Printer font of the LaserJet Plus and the Se-

ries II. Though the program includes some "icon art" constructed from ASCII characters, these are remarkable chiefly for their existence—they are not particularly attractive or useful.

But if advanced features are not necessities for you, you may appreciate the program's simplicity. It is easy to use, especially when working with a mouse. In short, *Instant Pages* is best for designing and printing simple forms based on the PC line-drawing characters. If this is sufficient for your needs, then you may well find *Instant Pages* to your liking.—**Alfred Poor**

JetForm Design

JetForm Design from Indigo Software is a stylish program. With this \$495 Microsoft Windows-based program, you draw lines with an on-screen pencil and create boxes by dragging a square pointer across the screen. You can draw boxes with rounded corners of varying radii, lay down arcs, circles, or shaded boxes; import graphics; scan in illustrations or whole forms; and even use bar codes. But *JetForm's* data entry facilities are as incomplete as its forms design abilities are complete, and this mars the program as a whole.

The design screen in *JetForm* has the familiar Windows look, with pull-down menus, dialog boxes, scroll bars, and so on. When you start the program, the work area is split vertically, with the left side showing a scaled-down, letter-size form

PC
MAGAZINE

FACT FILE



**Instant Pages,
Version 1.0**
Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
(800) 245-4525
(415) 571-7171
List Price: \$49.95

Requires: 256K RAM, Epson or HP LaserJet printers, DOS 2.1 or later.

In Short: Flexible and simple to use, *Instant Pages* can be a handy tool to have around if you often create simple one-of-a-kind forms. But it doesn't separate data from the form itself, so don't expect more than the basics. Not copy protected.

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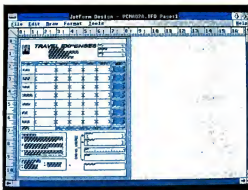
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■ FORMS SOFTWARE



JetForm Design, from Indigo Software, is a Windows-based application. On-screen, the work area is split vertically, with the left side showing a scaled-down form, and the right dedicated to a special "zoom" feature.

page. The right side of the screen is usually blank—it comes into play only if you change the form to a landscape orientation or if you zoom in on your developing form.

Although the left-hand form page is shown in miniature, it's still large enough to block out the major areas of your form. For more detailed work, *JetForm* lets you zoom in tightly on any part of the form simply by dragging the box indicator across the area you want to examine and releasing the mouse button. Many commands have speed-key alternatives that allow you to bypass the menus. For example, you can cut an object by pressing Shift-Del, or duplicate it with Ctrl-D.

You draw lines and boxes by dragging a pointer across the work area. You can create circles and logos by specifying their attribute values (such as the radii) in a dialog box under the Format Graphics menu. Both approaches are quick and easy; they make it fun to build a form. And because *JetForm* is a *Windows* application, you can have more than one form on the screen at a time and move elements between them. In fact, the only design elements you can't create are special characters like arrows and bullets.

TRACING MAKES SCANNING WORK

If you already have a paper form that you want to duplicate, you can cut your drawing time by scanning in the image of the existing form. You can then use *JetForm's*

Template command to convert the bit-mapped image to a *JetForm* file, which requires much less memory. The program displays the scanned form in a highlighted green, and you just trace over it using *JetForm's* drawing tools.

JetForm also makes it easy for you to change your forms after you've created them. You shrink or expand lines and boxes by pushing or pulling on their ends, or you can move them around with a special pointer. Objects that you created by attributes can be resized simply by changing the attribute values. A scaling feature lets you shrink or expand an entire area of the form.

Although text on the form changes according to its point size and font style, the screen display does not always match the printed text exactly. This happens because the screen versions of the text fonts are handled by *Windows*, which doesn't always do a perfect job. Even in a magnified view of our simple test form, with its top half filling the work area, the text in 8-point type was mostly unreadable.

On the plus side, *JetForm* supports all HP LaserJet- and PostScript-compatible fonts. (The next release of *JetForm* will come with Hewlett-Packard's *Type Director*, a font generator that can create soft fonts from 4 points to 200 points in size, in half-point increments.) Of special interest to those with industrial applications is *JetForm's* support for bar codes. The program can generate over half a dozen types

of bar codes, including the Interleaved 2-of-5, UPC-A, and Codabar symbologies, and print them anywhere on your form.

JetForm handles multiple-page forms, and you can use them to simulate multipart preprinted forms that you would normally have to print with carbon paper. To create a three-part form, for example, you would simply create a three-page form and use the same fields on each page. You could then program the form to copy the data on the top forms to the corresponding fields on the lower two forms.

JetForm gives you thorough control of forms printing. You can select the paper tray to print to, and using *JetForm's* duplex option, you can even print double-sided forms. The program exploits your LaserJet's macro features to speed up the printing of large numbers of forms.

NO DATA ENTRY SUPPORT The excellent design features in *JetForm* make the limitations of its data entry facilities stand out all the more painfully. At present you can't do more than designate a data field, and even this process is somewhat awkward. You must specify the length of the data field in columns, but the form grid is not measured in columns, so you have to either figure out the conversion for the grid



FACT FILE



**JetForm Design,
Version 1.01**
Indigo Software Ltd.
560 Rochester St., #400
Ottawa, Ontario
Canada K1S 5K2
(613) 594-3026
(800) 267-9976

List Price: \$495; *Print for Windows*, the runtime version, \$199.

Requires: 640K RAM, IBM AT or compatible, EGA or better graphics adapter, DOS 3.0 or later.

In Short: Microsoft *Windows*-based *JetForm* is an outstanding forms design tool, and it offers unique support for bar codes and scanners. But its current release has almost no data entry features, and until the next version of the program arrives to correct this deficiency, the program must be considered incomplete. *Not copy protected.*

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■ FORMS SOFTWARE

measure you're using or get the field to fit by trial and error. You can't indicate that a data field should contain numbers or a date; you can't do any math on a data field or protect one.

The company says that the next release of *JetForm* will correct all these data entry deficiencies. In the meantime, this is an outstanding program for forms design and printing. If the new version lives up to its billing, it should be a real contender for the top slot. —Henry Fersko-Weiss

Per:FORM

Delrina Technology's *Per:FORM* takes a painterly approach to forms design. This \$259.95 package, which runs under the GEM environment from Digital Research, makes designing and changing forms extremely easy. Though it is missing a few pieces, its unique combination of design finesse and data-handling muscle justly earns it our Editor's Choice designation.

You use *Per:FORM* much as you would use a paint program, pulling and stretching lines and boxes across the screen into the shapes you want and using the drawing tools to place and shade objects. After you place the objects on your form, you can expand or contract them with the aid of a pop-up pointing finger, and you can move them with the help of a little pop-up hand.

The work screen in *Per:FORM* is exceptionally attractive. It is black on white,



Per:FORM was the only package reviewed that runs under the GEM environment. Greatly resembling a paint program, *Per:FORM* has an extremely attractive display, and its easy-to-use drawing tools makes forms design a snap.

so your forms look very much as they would on paper, and the display is easy on your eyes. Rulers, delineated in inches or centimeters at your choice, extend along the top and left edges of the work area. You can set the standard intervals on the inch ruler to a half inch, a quarter inch, a tenth of an inch, and so on, or you can specify any fractional interval. You can adjust the horizontal and vertical measures separately. *Per:FORM* displays grid dots only at the full-inch measures, which is visually less confusing than a grid with dots every tenth of an inch.

The program's cross-hair cursor is your real navigational tool. It works like a sextant, fixing your position on the screen by sighting along both rulers at once. A short version of the cursor shows the cross-hair lines only on the rulers, while the long version shoots the lines right across the rulers and the screen to the intersecting point on your form. Which one you use is a matter of personal preference—with the long version you are never in doubt of your position, but the lines can be distracting.

MULTIPLE PERSPECTIVES Since most forms won't entirely fit on the screen in their actual sizes, *Per:FORM* gives you three viewing options. You do most of your design work in the "real" size, which gives you close-to-actual measurements on the screen (though the exact proportions will vary with the monitor you're using). The "fit in window" view shows the en-

tire form on the screen at once, so that you can see how all the objects relate to one another. In this view, small- to medium-size text is nothing but a squiggly hint of what is written. But the enlarged view blows up your form to twice its actual size, showing small text and fine details very clearly.

The program has a good assortment of drawing tools that sit on the left side of the screen like a designer's pegboard. Several tools help you draw boxes, with or without borders. (Borderless boxes give you invisible areas that you can treat as objects, moving them around, putting text in them and so on.) A thoughtful "comb" box tool divides a rectangle horizontally or vertically into equal compartments whose size you can control. Two tools let you draw perpendicular and diagonal lines, respectively, while two other tools let you enter text sideways or in regular orientation.

None of the tools draw true circles, although you can use the one that paints boxes with rounded corners to produce an object that looks circular if it's small enough. Lines and box borders come in any thickness you want, from thousandths of an inch up to a quarter of an inch. You can select from a series of line thicknesses or from several types of dashed lines by using pull-down menus.

FORM-FILLING MUSCLE *Per:FORM* fills in forms as capably as it designs them. The program supports many useful field types, including check marks, page num-


EDITOR'S CHOICE
FACT FILE



Per:FORM
Version 1.0
Delrina Technology Inc.
4454 Genesee St.
Buffalo, NY 14225
(716) 835-0405
(800) 268-6082
List Price: \$259.95

Requires: 640K RAM, graphics display, DOS 2.1 or later.

In Short: GEM-based *Per:FORM* offers a unique combination of design prowess, ease of use, and data entry strength. Despite its very slow printing speed, it's hard to beat this well-rounded program. Not copy protected.

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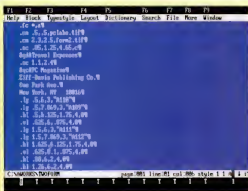
Per:FORM's other convenient form-filling abilities include user-selectable field entry order, required-entry fields, protection of calculated fields, user-definable help messages for field entry, and range control for both text and numeric fields. The program imports data files in many ASCII file formats and exports them in comma-delimited ASCII format.

In summary, there isn't much you can't do with *Per-FORM*—it lets you paint your forms precisely, change them easily, and fill them in with alacrity. Except for its very slow printing speed, its failings are minimal (the on-screen help is not context sensitive, there's no undo feature, and the rulers can't be set for picas or points). According to the vendor, the next version should take care of even these minor shortcomings. —**Henry Fersko-Weiss**

Polaris Forms

Designing a form with *Polaris Forms* is like planning a trip cross-country with no map, just the coordinates for longitude and latitude. As with *FormSet*, you don't draw a form on the screen with this \$149 program from Polaris Software. Instead, you use a word processor to describe the form with programming commands, positional coordinates, font names, graphic symbol numbers, and filenames, and then use *Polaris* to execute this miniprogram. This saves file space and makes for relatively speedy print times, but it turns form design into a slow, tedious process.

Installing *Polaris* is almost ridiculously simple—you simply enter the printer model (the program works only with Hewlett-Packard LaserJet printers or compatibles), the printer port, and the form filename on the main screen, and *Polaris* prints the form. The bottom of the screen lists five function-key commands that lead to a set of simple pop-up menus for printer choices and the directory listing functions. Another



To design a form with Polaris Forms, you write a program in your word processor and then compile it. You use two-letter commands and x,y coordinates to specify an object's type and placement.

er option takes you to a screen where you can describe the size and position of multiple forms to be printed on a single sheet of paper. In typical usage, though, you'll probably just type "PF (filename) [Return]" at the DOS prompt, which will bypass the *Polaris* screens and print the form using the defaults you've assigned.

The commands you use to design a form, define fields and import data are part of the program you write in your word processor. They come in two varieties—dot commands and ampersand commands.

Dot commands start with a period in column 1 and generally have two letters. VL stands for vertical line, BX for box, RP for repeat, and so on. These commands are followed by coordinates and length measurements for positioning the form elements. For example, you'd use the following command to draw a 4½-inch horizontal line 3 inches from the top of the page and 2 inches in from the left edge: ".HL 3.0,2.0,4.5,1.0".

You use ampersand commands to trigger font changes before and after text, to invoke a particular date or time format, and to merge data from outside files into data entry fields. Unlike the dot commands, the ampersand commands take up vertical space on the form because they represent printed areas.

A PROGRAMMER'S NIGHTMARE

As you can imagine, a form-generating program is a long list of characters and

numbers, like a stream of data, and is daunting to look at and read. The Purchase Order form we used for testing took 133 lines of code to create. Proofing this code is difficult and tiresome. Every command has to be exactly right or the form will print strangely. It's also difficult to know where on a form you are as you read through the design code. (You can add comment lines to the file, which help you to document what's going on, but this makes design a lengthier process still.)

If you forget a dot before a command,



FACT FILE



**Polaris Forms,
Version 2.1**
Polaris Software
613 W. Valley Pkwy.,
#323
Escondido, CA 92025
(619) 743-7800
(800) 338-5443

List Price: \$149

Requires: 512K RAM, HP LaserJet printer or compatible, DOS 2.1 or later, Hard disk recommended.

In Short: Writing a program to design a form in *Polaris* takes hours, especially because the program lacks error messages. Once compiled, though, the form prints quickly. *Polaris* can import ASCII files, but you'll have to rely on your database for data entry and verification. Not copy protected.

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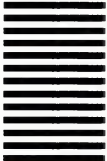
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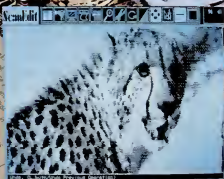
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 - Mouse Pocket
 - Genius Menu Maker
 - Dr. Genius Software
 - 9-25 Pin Adapter

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PC Magazine, Feb. 1989

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CIRCLE 492 ON READER SERVICE CARD

■ FORMS SOFTWARE

tracks cursor placement from the upper-left-hand corner of the page, while the other displays the cursor's relative position from a user-defined mark. *PowerForm* will work in either inches or in picas and points, but the manual correctly cautions against running *PowerForm* in inch mode except under special circumstances, since all typesetting functions—type size, line thickness, and line spacing—are measured in picas and points. Mixing the measurement systems can be frustrating and confusing. Unfortunately, the program complicates matters by displaying horizontal distances in picas and points and vertical distances in points alone.

■ *PowerForm*, developed primarily for computer typesetters, creates beautiful forms but does nothing to help you to manipulate text or data.

To design a form from scratch, you must first define a "tab area"—a concept that is best illustrated by a simple example. To draw a box, you would create a tab area by defining the corners diagonally across from each other. You'd then complete the box by linking its vertices with a "Super Mac" keystroke. Similarly, to set the type that is to appear inside the box, you would create a new tab area where the text is to appear. Simply moving the cursor to its desired position and entering the editor won't do. *PowerForm*'s documentation points out that this method allows you to place elements very precisely, down to a single point (1/72 inch), but it is nevertheless extremely cumbersome.

Once you've put the elements into your form, it is possible to erase or move them, but the procedure is quirky. *PowerForm* searches for elements to erase by locating the beginnings of tab areas. Just putting the

cursor on a form element will sometimes fail to locate the desired figure, because the element's tab beginning is some distance away. Although *PowerForm* has a command to expand the search area, cutting out form elements that are crowded together, such as the check boxes in our Purchase Order form, means sifting through a lot of elements until you locate the one you want to clip. Worse, the screen is not refreshed automatically after cutting, and if the element you removed touched another character on the screen, it will not reappear until you explicitly redraw the screen.

TYPESET-QUALITY TEXT You enter text onto your form by using an editor, which replaces the graphics display. Before you can enter text, you must go through a number of pop-up menu boxes, which ask for any changes to the current typeface, size settings, and justification. In keeping with *PowerForm*'s design history, the editor masters many typesetting problems, from changing typefaces and sizes inside a block of text to kerning (a typesetter's technique of tucking certain letters close together for aesthetic reasons). Unfortunately, *PowerForm*'s editor has few of the conveniences of a modern word processor. While *PowerForm*'s documentation declares that its editor is "more than a word processor," a more accurate description of it might be "something other than a word processor."

You can import graphics into *PowerForm*, but only after translating them with the appropriate utility. Currently, the translation program accepts only two-color PCX files. Files created in 16-color mode, even if they use only two colors, are not acceptable.

PowerForm has no data entry capabilities. For most form-filling applications, you would create your files outside *PowerForm* and import them into the package. You can load ASCII, WordStar, or XyWrite files into *PowerForm*'s editor, but only after translating them with the utility programs that come with the program.

The Computer Group promises a highly advanced version of *PowerForm* (which should be available by now) with better screen displays and compatibility with the major monitor drivers, as well as better-written and more-frequent error messages.

PC EDITOR'S CHOICE

• Per:FORM

In a field of contenders ranging from stark compilers to sumptuous graphical packages, Per:FORM stands out by virtue of its looks as well as its talents. Running within GEM and enclosed by design-aiding rulers, this \$259.95 package lets you paint, rather than merely spec out, your forms. Its drawing tool icons are a special feature; the comb tool, for example, draws a rectangle divided into equal compartments. It even has a pop-up pointing finger that can expand or contract the size of form objects.

But Per:FORM does more than just let you create forms easily. It fills in forms as capably as it designs them, offering a variety of field types, and even calculated fields. It both imports and exports ASCII data files.

Per:FORM is not perfect: its major failing is that it's slow. Of the 16 packages we reviewed, it took by far the longest to print out a simple form: 4 minutes and 50 seconds, to be exact. A spokesperson for Delrina Technology, Per:FORM's creator, blames this result on the GEM printer driver that the current version of the package is using. The driver is presently being rewritten.

For skilled professionals who need to create typeset-quality forms, these improvements will be welcome. But for the average user interested in filling in forms, *PowerForm* is simply not the right package.—Richard Lewit

Henry Fersko-Weiss is a free-lance writer in Warwick, New York. Robert Kendall is a New Jersey-based free-lance writer and editor who specializes in computers. Richard Lewit is a free-lance science writer. Alfred Poor is a contributing editor of PC Magazine.

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Peter Norton
COMPUTING

All Utilities now support large hard disks under DOS 4.0, COMPAQ DOS 3.31, and the PC, MOS/386 multi-tasking operating system. Designed for the IBM PS/2 and PC families and 100% compatibles. © 1989 Peter Norton Computing, Inc. 100 Wilshire Blvd., 9th Floor, Santa Monica, CA 90401 1104



The Norton Disk Comparison is included, free, with both the Standard and Advanced Editions. The Norton Troubleshooter is yours with the Advanced Edition.



The ELEMENTS



THE PC GAINS MORE GROUND EVERY DAY IN ITS race to catch up with Gutenberg and his heirs.

With today's laser printers, any PC user can print a page in any of hundreds of typestyles. But no matter how deep the pockets and how large the disk of a desktop publisher, the range of typefaces and designs available on the PC can't match the variety available to a well-equipped print shop. Nor can the 300-dot-per-inch printers on our desktops match the sharp lines and smooth curves available with traditional type cast from hot metal or with 2,540-dpi computerized typesetting machines.

Although PC-based laser printing hasn't quite caught up to the heirs of Gutenberg, the large variety of fonts and font utilities available for the Hewlett-Packard LaserJet and its compatibles—and the narrower range available for PostScript printers—shows that the PC has indeed come a long way. Now *PC Magazine* examines the different categories of PC-based font products—and the different ways to use and manage all those typefaces.



of TYPE STYLE

BITMAPS FOR BEGINNERS All laser printers work by placing small black dots on a white page. To print the letter *A* the printer has to be told where to place the dots for the pointed top of the letter, then where to place the dots that create the diagonal and horizontal lines below it.

The printer needs a map that tells it where to place each dot, and that map is called a *bitmap*. It resembles a piece of graph paper in which some squares are filled in and some left blank. The pattern of squares corresponds to the pattern of dots that make up each individual character. In a computer or printer the bitmap is represented by a sequence of binary digits. A 1 indicates that a dot should occupy that position on the map; a 0 means that the position should be left blank.

In the terminology used for computer printing, a *font* is a set of bitmaps that constitutes an alphabet of characters of a certain point size. Ten-point Times Roman is one font; 10-point Times Roman Italic is another; 12-point Times Roman is a third, and so on.

With few exceptions, fonts for the HP LaserJet consist of

sets of bitmaps stored in one of three places: the ROM built into the printer itself; the ROM in a cartridge that you can plug into the printer and remove; and *soft font* files that are stored on your hard disk, and that you can transfer, or download, temporarily to the RAM of the printer.

In the centuries of hot metal type, designing a font was an art. In the age of the 300-dpi laser printer, art must be combined with science. When creating a bitmap font for a laser printer, it isn't enough simply to take a piece of graph paper on which each square represents a $1/300$ -inch dot, then draw the outline of each character on the graph and darken each square that fits within the outline. Any slanted or curved line will cut across some squares, forcing you to decide which squares to darken and which ones to leave blank. The decision is much harder than it seems.

Intuition suggests that the best way to approximate a slanted line on a coarse bitmap is to darken the dots that will create a regular "flight of steps" corresponding to the slant. But research on visual perception shows that intuition is wrong. The

a b c D E f g h i J K L M n o P q r S t u V w X Y z a b c d e F g h i J k L m N o

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R
S
T
U
v
w
x
Y
Z
A
B



Most printer cartridges offer 4 type sizes.

C d e F g h i J k L m N o P Q R s T u v W x y z a b c D e F g h i j k L m N o P Q

Bitstream



On the other hand, Bitstream scaleable type can offer any size you want from 2 point to 144 point. Giving you hundreds more type sizes for about the same price as one printer cartridge. Moreover, you get the larger sizes that are so important for presentations and headlines. Bitstream also offers 5 times as many typefaces to choose from. And unlike cartridges, you can mix and match faces without any limits. Finally, Bitstream scaleable type works with all the leading laser printers, including Hewlett-Packard® and PostScript® PDL printers. Maybe that's why the leading makers of word processing and desktop publishing packages offer Bitstream® typefaces with their products, too. For the name of the Bitstream dealer nearest you, call 1-800-522-FONT. You'll see that cartridges just don't size up to Bitstream scaleable type.

Bitstream

CIRCLE 218 ON READER SERVICE CARD

A GRAPHIC DESIGNER'S VIEW OF PC-BASED FONTS

It's no small feat to make a font look good at 300 dots per inch, but some fonts survive at this resolution anyway. Although type printed at 300 dpi by a desktop laser printer won't measure up in appearance to traditional type cast from hot metal or printed at 2,540 dpi by a computerized typesetting machine, it often takes a trained eye to spot where the better-rendered versions of traditional fonts depart from their models. Keeping in mind that such subtle differences will disturb only the most discriminating reader, we've asked Beth Tondreau, a New York-based graphic designer, to critique the fonts produced by the PC-based font products reviewed in this article. Here are some samples of typefaces, along with her comments.

F

Anacom MX1 Tms Rmn

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234

erg invented movable type around 1456, cra
it their own printing offices. Today, when ty
and few printers design their own fonts, dig
o create new versions of time-honored desig
le, sometimes with less-than-honorable rest

The Anacom AlfaJet MX-1 Maxi-One Cartridge produces a Times Roman variant that incorporates some alien serifs, particularly on the capital "F" and "T."

Today

Adobe Times Roman

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234567

berg invented movable type around 1456, cra
heir own printing offices. Today, when type
und few printers design their own fonts, digita
to create new versions of time-honored desig
able, sometimes with less-than-honorable rest

Adobe PostScript Times Roman, which you can produce with the Adobe Type Library, is fairly true to the design of Times Roman. Unfortunately, the kerning isn't well balanced. Note the word "Today," where there is too much space between the "T" and the "o" and too little space between the "o" and the "d." Also, in the word "offices," the ascender of the "f" and the dot of the "i" run into each other.

SO

Bitstream Dutch

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234

After Johannes Gutenberg invented movab
cast type in hot metal at their own printing
set mostly by computer and few printers de
typographers continue to create new versio
sometimes with honorable, sometimes with

Fontware's Bitstream Dutch font is sturdy but a bit too wide. The serif on the "s" is overly pronounced, and the "o" becomes too square in its attempt to negotiate the curves.

1456

Megafonts Timo-Romano

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

erg invented movable type around 1456, craft their own printing offices. Today, when ty and few printers design their own fonts, dig create new versions of time-honored design e, sometimes with less-than-honorable results.

The hyphens in Megafonts' Timo Romano font are as wide as em dashes. The vertical strokes are too bold compared to the other parts of the letterforms, giving the characters (and therefore the copy) an uneven density. And the letter spacing, which is too wide for the letters, is too tight for the numbers.

con

Storch Premium Series Times Roman

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz12

After Johannes Gutenberg invented movable type, craftsmen cast type in hot metal at their own printing offices. Today, when type is set mostly by computer and few printers design their own fonts, digital typographers continue to create new versions of time-honored designs, sometimes with honorable results.

SoftCraft's Storch Premium Series Times Roman looks as if it were set on plastic and then pulled slightly askew. The "c" slumps forward and the "s" leans backward. The serif on the "t" has an odd peak. Overall, the font is too heavy.

g

Gradco Herald

ABCDEFGHIJKLMNOPQRSTUVWXYZ
defghijklmnopqrstuvwxyz12345678

tenberg invented movable type around 1456, craft their own printing offices. Today, when type and few printers design their own fonts, digital typographers create new versions of time-honored designs, sometimes with less-than-honorable results.

PrintCon's Gradco Herald has a capital "B" with a collapsing bowl, a lowercase "b" with an odd bump on it, a serif on the capital "T" that isn't straight, a lowercase "g" with a shaky loop, and a lowercase "c" that should extend below the baseline but doesn't.

b

Elfring Soft Fonts Roman

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz1234

enberg invented movable type around 1456, craft their own printing offices. Today, when type and few printers design their own fonts, digital typographers create new versions of time-honored designs, sometimes with less-than-honorable results.

The "b" in Elfring Soft Fonts' Roman font has an odd spur. In addition, the final of the "a" is not perfectly smooth, and the serifs extending from the crossbar of the "T" are swollen.

■ FONTS

eye doesn't translate those flights of steps into a smooth line. However, the eye will interpret some highly complex patterns of protuberances and indentations as a smooth line, and only the most expert font designers know how to draw those patterns. If you take a font editor and compare two italic LaserJet fonts, you'll find that the smoother-looking font actually has some edges that look like an exotic sawtooth pattern when enlarged by a factor of 100 or more.

PICKING A CHARACTER SET The group of characters that make up a font is called its *symbol set* or *character set*. The minimal character set for most fonts is the USASCII (low-order) set, which consists of the letters, numbers, and other symbols that you would find on a standard computer keyboard. The Legal set substitutes characters like the Registered, trademark, or copyright symbols for little-used keyboard characters. Both of these sets have 96 characters.

Fonts with *extended character sets* have 192 to 256 characters. The most common is Hewlett-Packard's Roman-8 set, which includes the characters needed for most European languages. *Microsoft Windows*, *Ventura Publisher*, and *PostScript* each have their own extended symbol sets. Always buy fonts with extended characters, even if you don't think you'll ever need them. Someday you'll have an important client or customer with a name like Gödel or Garçonne, and she'll be very unhappy if you can't spell her name.

HARD FONTS, SOFT FONTS Built-in fonts and cartridge fonts are the most convenient kind to use. As long as your software can give the commands that tell your printer to use a certain font, you never have to think about these "hard" fonts. *Soft* fonts are trickier to deal with. They disappear from the printer's memory every time you switch it off, and you or your applications have to remember to download them before you try to use them for printing.

Another inconvenience with soft fonts is the amount of space they take on your disk. A 10-point font with only the standard keyboard characters needs about 10K of disk space. But a large headline font can require a few hundred kilobytes. A full

collection of LaserJet fonts can easily overwhelm a small hard disk and take up quite a bit of space on a large one.

If you need to choose among dozens of different fonts, you might find the stored bitmap approach used by the LaserJet to be cumbersome. PostScript printers, on the other hand, don't normally use stored bitmaps. When an application tells a PostScript printer to print some text in 15-point Helvetica, the printer constructs the necessary bitmap in its own memory. To do this, it consults a "typeface outline" that contains data on the shape—but not the size—of each character. These typeface outlines are stored either in the printer's

■ One inconvenience with soft fonts is the amount of disk space they take up. A full collection of LaserJet fonts can easily overwhelm a small hard disk.

ROM or in a file on-disk.

The typeface outline is a coded representation of the imaginary and ideal form of the character, rather than one you can actually see or print. The PostScript interpreter in the printer converts that ideal into bitmaps that attempt to represent the ideal at the size requested.

In the real world of 300-dpi laser printing, the PostScript bitmaps can't equal the quality of a LaserJet bitmap that someone has brought into a font editor and tuned for the best possible appearance. And PostScript laser printers are slower to print text than LaserJets, because they have to construct the font before printing. The LaserJet simply lays down dots according to the bitmap already in its memory. But PostScript printers give you an infinite variety of sizes, without making you store separate bitmaps for every size you need.

BEATING THE JAGGIES At 300 dpi, type looks ragged—especially when it is printed in a large point size. A diagonal line tends to look like a flight of steps. A curved line changes its thickness and has odd angularities that don't belong there. An upgrade to 400 dpi, as in the PostScript printer that will come with the NeXT computer, doesn't make a spectacular difference, but when 600 dpi arrives on your desktop perhaps a few years from now, it will begin to approach typographic quality. Twelve hundred-dpi printing on desktops won't arrive in the foreseeable future, and the 2,540-dpi resolution of this magazine is more distant still.

Meanwhile, some expensive add-ins for the HP LaserJet Series II bring 600- by 300-dpi printing to today's desktop. The \$3,995 LaserMaster LX6 Professional controller card is the best of these. With drivers for *Microsoft Windows* and *Ventura Publisher*, plus support for *WordPerfect* and *Microsoft Word* on the way, it gives you the sharpest and clearest type you can print on a desk. It uses scalable type comparable with PostScript's, so its fonts don't waste space on your disk.

A STREAM OF FONTS The original LaserJet could use only its own built-in fonts and fonts stored in cartridges. Its successor, the LaserJet Plus, was the first model that accepted soft fonts. At first, the only soft fonts you could get were the ones that vendors decided to sell you. If a vendor didn't offer a 25-point Times Roman, the LaserJet user was out of luck.

Then Bitstream introduced its *Fontware* font-generator program, which brought some of the flexibility of PostScript to the LaserJet. *Fontware* worked with typeface outlines similar to those used by PostScript printers. You selected the size you needed, and *Fontware* generated a bitmap, which it then stored on-disk. You could use these soft fonts in exactly the same way you used store-bought soft fonts.

Other font generators followed in *Fontware's* footsteps. Among the most interesting and impressive is the latest version of SWFTE's *Glyphix*, which works as a kind of PostScript for the LaserJet printer. When you print a file, *Glyphix* can generate the bitmaps that you need and then

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CIRCLE 541 ON READER SERVICE CARD

With Type Director And Your LaserJet, You've Got A Whole New Avenue To Explore In Producing Documents.

Great typefaces. All the top art directors on Madison Avenue use them to help their ads grab people's attention.



And now, thanks to Type Director™, you can use them to help get the same kind of attention for your documents.

Co-developed By Hewlett-Packard. Type Director is the fastest, easiest-to-use font generation program you can own for your PC. A joint development of Hewlett-Packard and AGFA Compugraphic Division, it adds remarkable power to your LaserJet® printer to produce documents that look like they were prepared by communications specialists. It's ideal for all word processing and desktop publishing applications from the simplest memos to multi-page newsletters.

Compugraphic. One Of The Biggest Names In Type. When you think about it, it shouldn't come as a surprise. After all, AGFA Compugraphic is a supplier of typefaces to top advertising agencies, printers and publishers everywhere. Its typeface library is the biggest and best in the world, with over 1700 typefaces.

The Big And The Small Of It. A high-performance scaling technology found only in Type Director lets you make each typeface bigger or smaller until it's the exact size you want, from a tiny 4 points to a huge 200 points. But no matter what size you finally do decide on, each character will be crisp, clear and handsome.

We've Seen To It That There Are No Surprises.

When you're using Type Director, you see the characters on your screen exactly as they'll appear in your output. There are no surprises when you print out the results. And you get the fonts you need in just a few moments—decidedly more quickly than with any other software available today.

You'll Wonder How You Managed Without It. What is Type Director's impact on the fonts you're using now? Not to worry. Type Director will easily manage any "soft fonts" you may have as long as they're Hewlett-Packard LaserJet compatible.

(Most are.) By converting to

Type Director, you protect your investment while making your desktop publishing system much more flexible and useful.

Type Director Does It All.

Think about it. Type Director lets you generate characters, monitor and manage your library of typefaces, automatically install them in your application, and immediately send them to your printer—all by touching just a few keys.

Learn By Doing. Not By Reading. Type Director is incredibly

Type Director Compatibility Information.

Type Director is fully compatible* with the following:
COMPUTERS IBM XT/AT, Personal Systems/2 and compatibles with hard disk, 640K bytes RAM, running MS-DOS or OS/2. PRINTERS Hewlett-Packard LaserJet PLUS, LaserJet 500 PLUS, LaserJet 2000, LaserJet Series II, LaserJet III and compatibles. APPLICATIONS/ENVIRONMENTS Aldus PageMaker 1.0 and 3.0, Xerox Ventura Publisher 2.0, Microsoft Word 4.0 and 5.0, Microsoft Windows 2.03 and 2.1, WordPerfect 5.0, Other software programs supporting LaserJet "soft fonts". DISPLAYS VGA, CGA, EGA, Hercules Monochrome, AT&T 6300, Xerox PC Full Page Display, WYSE 700 Graphics, Compaq Monochrome, Hi Res Monitor (564x360), Hi Res Monitor (1024x1000).

*For complete compatibility information on printers, displays and applications, please call 1-800-873-FONT.

MADISON AVE

simple to use.

It's entirely menu-driven, so there's no thick manual to have to hunt through. All you do is respond to the prompts on the screen. A built-in HELP function handles any questions that may arise.

Go Creative With Your Documents Now. You don't have to wait any longer. Your documents can

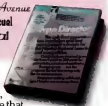
Save \$455 On Our Type Director Debut Edition.

Priced separately you'd pay \$680 for Type Director and our Debut Edition of typefaces, but order now and they're yours for only \$225.

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- Vol. 1 Four typefaces from the CG Times family
- Vol. 2 Four typefaces from the Univers family
- Vol. 3 From the Decorative collection:

Park Avenue
Dom Casual
Unicaal
Brush



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AGFA

AGFA COMPUGRAPHIC DIVISION

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■ FONTS

send them directly to the LaserJet.

Some applications know all about using soft fonts in printing; others hardly know they exist. Some word processors now let you use soft fonts as easily as you use any other font. Lotus's *Manuscript* and MicroPro's *WordStar*, Release 5, come with utilities that can read the LaserJet or soft-font files or PostScript typeface-outline files on your disk and extract all the information they need for printing.

Other programs need more help. You can buy third-party utilities that let *WordPerfect*, *Microsoft Word*, *XyWrite*, *Nota Bene*, *Ventura Publisher*, and *Microsoft Windows* applications like *PageMaker* use, any LaserJet soft font you own. All of these applications besides *XyWrite* are now clever enough to automatically download any soft font required by a document. You no longer have to set up download utilities and batch files to download fonts in advance—although you can usually save time by doing so.

BEYOND COURIER For many users, Courier is enough. Thousands of LaserJets give loyal service as the equivalents of fast, silent Selectric typewriters. But the laser printer makes it possible to use proportional-spaced fonts for greater legibility and elegance, and there's no reason to restrict yourself to typewriter fonts. For letters, reports, and some desktop publishing, the Times Roman and Helvetica fonts in standard font cartridges are generally enough. Other cartridges include fonts for presentations, for math and technical writing, for printing large spreadsheets on a single page, and for creating forms. You can get enormous variety out of the LaserJet without ever thinking about soft fonts.

But for almost anything unusual, elegant, or eye-catching, the only choice is a soft font. With soft fonts, you have access to more than 250 different typefaces in any size from a tiny 3 points to the height of the page. You can buy prepared soft fonts in the sizes and symbol sets chosen by the soft-font vendor, but if you want exactly the font you need, and not an approximation, you're better off using a font-generator and buying the typeface outlines that work with it.

With the best font generators you can create fonts with the size, slant, darkness,

and characters that you specify. This means that you can use your computer to print pages that reflect your own personal or corporate identity in ways that no other program allows.

THE HIGH COST OF FONTS One thing fonts won't save you is money. Fonts are expensive, and there's no sign of their getting any cheaper. One reason for their high cost is the high cost of licensing fees. The best soft fonts are licensed versions of designs made by the large type houses like International Typeface Corp. (ITC) and Linotype. But another reason for the high cost of fonts seems to be that the vendors charge what the market will bear, and the font market is booming.

What happens to your expensive fonts when the next generation of printers ar-

■ Fonts are expensive, and there's no sign of their getting any cheaper. Vendors charge what the market will bear, and the market is booming.

rives? Your bitmap fonts will be worthless, whether they're in cartridges or disk files. Font generators can be updated to create 600-dpi bitmap soft fonts, but these will need four times the disk space needed by 300-dpi fonts. The next generation of printers will use scalable type exclusively. PostScript is one technology that will still be in use when 600-dpi desktop printing arrives. But Hewlett-Packard, working with Agfa Compugraphic, is developing a rival technology, and Microsoft and IBM have begun muttering about alternative technologies linked to Presentation Manager.

Meanwhile, even at 300 dpi, you can perform some considerable feats with a laser printer. Even Gutenberg might be impressed.

Hard Disk Subsystems Should Be Total Solutions. Not Part Of The Problem.

Many hard disk units create more problems than they solve. Like cumbersome installation procedures, inadequate documentation, hardware/software incompatibilities and high rates of field failure. It's clear that there's a great deal more to total cost of ownership than a "great deal" up-front.

Buy a raw drive, get a raw deal

Many "so-called" hard disk subsystems are no more than a collection of third party components casually thrown together—the "drive du jour," miscellaneous software patches and an assortment of hardware.

What appears to be lower cost initially can end up being a lot more trouble—and money—than you bargained for. Like the frustrations of getting the system up and running. The expense of system downtime. And, the cost and time of recycling products that just don't work right.

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your valuable data (or your business) to a bare drive boxed up with a bunch of spare parts. Parts untested with each other, much less in your application environment.

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Font Cartridges

PLUG 'N PLAY TYPOGRAPHY



*Font cartridges
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easiest way
for your laser printer
to use a wide
variety of fonts.*

IT ALL STARTED WITH A SMALL rectangular slot in Hewlett-Packard's original LaserJet.

If you wanted more fonts than the typewriter-style Courier and no-style Line Printer that HP built into its printer, you had to buy a cartridge and plug it into that slot. The advantage was that a cartridge font worked the same way as a font built into the printer; if your software knew how to use it, you never had to think about it again. By now, almost every serious application knows how to talk to font cartridges, and they're still the easiest and fastest way to obtain a wide choice of fonts.

HP's first offerings gave you bold and italic Courier in the A Font Cartridge and an almost illegibly light and spaced-out Times Roman in the B. At least you got a proportionally spaced font, even if all its proportions looked wrong.

Matters improved somewhat—but not enough—with the F cartridge, which tightened the Times Roman font and added foreign characters. Soon other HP cartridges added another proportional font, Helvetica, plus fixed-width Prestige Elite, Letter Gothic, line-drawing, OCR, and even bar-code fonts. HP finally got the Times Roman and Helvetica fonts right in

■ FONT CARTRIDGES

the Z Font Cartridge (later upgraded to the Z1A, which contained foreign characters).

HP's cartridges aren't perfect, although their faults tend to be minor. In the 12-pitch Prestige Elite, the hyphen is so short that it looks almost like a dot, but HP got it right in other sizes. HP never noticed that for business correspondence, 10-point Times Roman is too small, 12-point is too large, and 11-point is just right. HP is run by engineers, and engineers like even numbers; so you can't find an 11-point Times Roman in HP's cartridges.

When other vendors began selling knockoffs of HP's cartridges, they were faithful even to HP's mistakes. No one had the nerve to sell a cartridge that wasn't substantially an HP clone until Computer Peripherals and Pacific Data Products offered cartridges with special fonts designed for printing spreadsheets. You had to enter elaborate codes, but the tiny fonts let you fit a gigantic spreadsheet onto a single page. Microscopes were not included.

THE RIVALS The cartridge market turned upside down in 1988, when IQ Engineering introduced its elegant Super Cartridge 1, a single cartridge with 55 fonts matching most of the fonts in 23 of HP's cartridges. Since then, virtually everyone has brought out a rival version—even HP, with its 65-font ProCollection cartridge. Some vendors pack more than 100 fonts into a single cartridge.

These ultracartridges are trickier to design than standard cartridges. Some models won't work in the original LaserJet or the new LaserJet IID. Many stumble up against an electronic wall that their vendors seem amazingly unaware of.

That "wall" is an undocumented but easily discovered limitation in the LaserJet Series II. The Series II lets you add no more than 168 soft fonts and cartridge fonts. And if you want to use the Series II's normal capacity of 32 soft fonts, you must use no more than 136 cartridge fonts, because each cartridge font above 136 blocks access to a soft font. If you add 32 cartridge fonts above 136, you won't be able to use soft fonts at all. No matter how many soft fonts you download, the printer simply ignores them.

To avoid unpleasant surprises, each cartridge you use in the two slots of the La-

serJet II should have no more than 68 fonts, so the total won't exceed 136. The moral, with ultracartridges as with everything else, is that biggest is not always best. With ultracartridges, biggest is probably worst.

Following HP's example, almost all cartridge vendors sell cartridges with fonts in portrait mode, landscape mode, or a combination of the two. Most of the giant ultracartridges have a lot of portrait fonts and a few landscape fonts. The reviews that follow mention any variation on these general rules.

ANACOM GENERAL CORP.

Anacom AlfaJet Laser Print Font Cartridges

With their flimsy paper labels, simple manuals, and chunky-looking plastic cases, Anacom's AlfaJet Laser Print Font Cartridges don't look impressive from the

outside. But what matters most are the fonts, and Anacom's are equal to or better than HP's. Their prices are also better than HP's by 15 percent.

Anacom has an AlfaJet cartridge that's plug-compatible with anything HP offers. There's even a \$255 equivalent of HP's new \$300 ProCollection ultracartridge. But the pride of the line is the \$675 AlfaJet MX-1 Maxi-One Cartridge, an ultracartridge with the standard set of "Tms Rmn" and "Helva" fonts, plus Presentation, Letter Gothic, Prestige Elite, math, OCR, line-drawing, bar-code, and other fonts. The 72-font total exceeds the 68-font safety limit, but not by so much that it will affect the great majority of users.

Most fonts in the MX-1 have the full Roman-8 character set, and almost everything you would want from any HP cartridge is included. Drivers for *WordPerfect* and *Microsoft Word* come in the box, and Anacom one-ups other vendors by adding a *DisplayWrite 4* driver.

DARK AND SMOOTH Anacom's proportional fonts tend to be slightly darker and more legible than HP's, and they have somewhat smoother curves. The accents on foreign characters are much heavier than HP's, not always to Anacom's advantage. The Prestige Elite hyphen, unfortunately, is worse than HP's, but the Letter Gothic and Presentation fonts are better drawn.

The exterior workmanship on Anacom's cartridges doesn't equal HP's, but the internals are just fine. These cartridges are the best choice if you're looking for a direct counterpart to an HP cartridge, and one of the better choices if you're looking for an ultracartridge. And if you want to put a set of soft fonts into a custom cartridge, Anacom will burn in any six fonts for \$250, with \$25 for each additional font. They'll also include your letterhead and any other logo.

COMPUTER PERIPHERALS INC.

Computer Peripherals JetFont SuperSet

Computer Peripherals' JetWare line of cartridges ranges from versions of HP's humble B and F cartridges to a \$399 two-car-

**FACT FILE**



Anacom AlfaJet Laser Print Font Cartridges
Anacom General Corp.
Computer Products Division
1335 S. Claudia St.
Anaheim, CA 92805
(714) 774-8080

List Price: AlfaJet MX-1 Maxi-One Cartridge, \$675; AlfaJet PC Maxi-Pro Cartridge, \$255. Over 20 additional HP-compatible cartridges available, from \$127.50 to \$280.50 each.

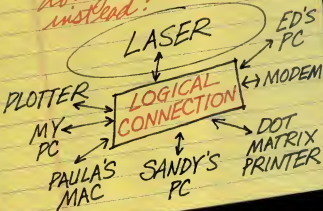
Requires: HP LaserJet or compatible printer.

In Short: Good fonts, full character sets, and high HP compatibility make Anacom's cartridges an intelligent choice. The 72-font Anacom AlfaJet MX-1 Maxi-One Cartridge embodies most HP cartridges in one.

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1610 VGA	16" 0.31 Color	VGA/8514A Compatible

■ FONT CARTRIDGES



FACT FILE



Computer Peripherals JetFont SuperSet
Computer Peripherals Inc.
667 Rancho Conejo Blvd.
Newbury Park, CA 91320
(800) 854-7640
(805) 499-5751

List Price: \$399 (two cartridges)

Requires: HP LaserJet Plus, Series II, or compatible printer.

In Short: A good spreadsheet cartridge is the best value in the line. Fonts in other cartridges tend to be crude, and the JetFont SuperSet pair lack many characters claimed for them on the box.

Circle 4 on Reader Service Card

tridge extravaganza called the JetFont SuperSet. Between those two poles, Computer Peripherals offers a version of the original Z cartridge; a combination cartridge with Courier, Prestige, and legal fonts; and a "12/30" spreadsheet cartridge with fonts ranging from a minuscule 3.3 points to a comparatively Brodingnagian 8.3 points.

Most of Computer Peripherals' JetWare typefaces are products of a California company called Xiphias. The spreadsheet font, called Lotica by Computer Peripherals, is surprisingly legible even at small sizes. But the proportional fonts tend to be among the coarser and less-graceful designs available for LaserJets. The characters in the "Tms Rmn" font, which doesn't really resemble Times Roman, tend to be too wide for the space that the font itself tells the LaserJet to allot, making the text look cramped. The font is readable and better than many soft fonts, but irritating in large doses.

NOT QUITE STANDARD Xiphias's Prestige Elite font is a crude design that scarcely looks like the standard versions,

although it may be interesting as a change of pace. The 7-point Prestige looks sketchy and unfinished. The Presentation fonts have a fussy design that impedes easy reading.

All these fonts and more fill the two cartridges that make up the SuperSet. For your \$399, you get a total of 151 fonts—which means you can load only 15 soft fonts instead of 32 into a LaserJet II. One of the two cartridges emulates 15 HP cartridges, including bar-code, math, and line-drawing character sets. The other emulates HP's Presentation, Times Roman, and Helvetica fonts and adds five sizes of the Lotica spreadsheet font. Fixed-width fonts are liberally represented in landscape mode.

One oddity of the SuperSet is the explicit claim in the manual and the packaging that the proportional fonts include the Roman-8 character set. Although the two sample sets tested by *PC Magazine* included these characters in Courier, they were missing from the Times Roman and Helvetica fonts, so you'll get a rude surprise if you try to use them. Computer Peripherals should perhaps consider issuing a superSet of the SuperSet.

EVEREX INC.

Everex HardFont Cartridges

If every cartridge manufacturer supplied software as good and plentiful as that included with the Everex HardFont Cartridges, no one would be frustrated by fonts.

For any cartridge that isn't an exact counterpart of one of HP's models, Everex includes a driver disk with more drivers than any other vendor dreams about. A typical disk has drivers for *WordPerfect*, *Microsoft Word*, *WordStar 2000*, *MultiMate*, *Print*, *dBASE*, and *XyWrite*. Everex's workmanship and manuals are equally impressive, and the elegant packaging doesn't waste space the way everyone else's does.

Like Computer Peripherals, Everex begins with versions of the B, F, and Z (not the Z upgrade) cartridges. Those cartridges cost \$175, \$185, and \$195, respectively. Everex adds the SST spreadsheet



FACT FILE



Everex HardFont Cartridges

Everex Inc.
48431 Milwint Dr
Fremont, CA 94538
(800) 821-0806
(415) 498-1111 (in Calif.)

List Price: HardFont Cartridge B (for word processing), \$175; Cartridge F (for word processing), \$185; Cartridge T (for tax forms), \$185; Cartridge Z (for legal documents), \$195; Cartridge LGL (for legal documents), \$250; Cartridge SST (for spreadsheets), \$250; Cartridge BST (for word processing and spreadsheets), \$250; Cartridge All-in-I (includes all features of Cartridges B, F, T, Z, LGL, SST, and BST), \$395

Requires: HP LaserJet Plus, Series II, or compatible printer.

In Short: Extensive and well-written software drivers and good workmanship combined with lesser-quality fonts.

Circle 5 on Reader Service Card

cartridge (\$250) with fonts ranging from tiny to reasonable in size; the LGL cartridge (\$250) for legal documents, with Prestige Elite, Letter Gothic, and two sizes of Courier; and a version of HP's T cartridge (\$185) for tax forms. All the fonts from these cartridges—110 fonts in all—squeeze themselves into Everex's \$395 All-in-I ultracartridge.

Unfortunately, Everex's fonts don't live up to their well-crafted trappings. The Everex line uses Xiphias fonts similar to those in Computer Peripherals' JetWare (and the Everex cartridges are also available directly from Xiphias). The Xiphias fonts, while readable, are cruder than most of the competition's. There's no need to repeat the unhappy details from the Computer Peripherals review.

This is all very disappointing because the care and skill that goes into Everex's supporting software is worthy of the very finest typefaces.

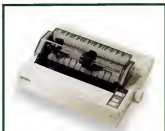
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- Clipper (Summer '87, dBase Plus compiler) ... 429

New England Software ... NCP

- Graph-in-the-Box 2.2 ... 75
- GB-Stat 1.0 ... 159
- GB-Analytic 1.0 ... 105

Nolo Press ... NCP

- WillMaker 3.0 ... 35
- For The Record 1.0 ... 35

North Edge Software ... NCP

- Timeslips III 3.3 ... 115

Norton-Lambert ... NCP

- Close-Up Customer 3.0 ... 135
- Close-Up Support ... 165

Owl International ... NCP

- Guide 2.0 ... 143

Paperback Software ... NCP

- VFP-Planner Plus 2.0 ... 145
- VFP-Expert 2.02 ... 145

Paul Mace ... NCP

- Develop 1.02 ... 29
- HTest—HFormat 2.0 ... 49
- Mace Utilities 5.0 (DOS utilities) ... 55
- Mace Gold 1.0 ... 79

PC Support Group ... NCP

- Lightning 4.82 ... \$39
- Lucid 3-D 2.0 ... 75

Personics ... NCP

- SmartNotes 2.0 ... 49
- SeeMORE 1.02 ... 49
- Look&Link 1.04 ... 59
- Ultravision 1.1 ... 79

Peter Norton ... NCP

- Norton Editor 1.3 ... 39
- Norton Commander 2.0 ... 45
- Standard Utilities 4.5 ... 55
- Advanced Utilities 4.5 ... 79
- Dan Bricklin's Demo Program 2.1.0 ... 99

Quarterdeck ... NCP

- Expanded Memory Manager 386 4.2 ... 39
- DESQView 2.24 ... 79
- DESQView 386 1.0 ... 115

Reference Software ... NCP

- Grammatik III 1.07 (electronic proofreader) ... 52
- Reference File 1.0 (pop-up DB manager) ... 49

Relay Communications ... NCP

- Relay Gold 3.0 ... 149

Revolution Software ... NCP

- VGA Dimmer 2.01 (screen saver) ... 19

Rightsoft ... NCP

- Rightwriter 3.0 ... 54

Samsa ... NCP

- Ami 1.0 ... 129

Simon & Schuster ... NCP

- Typing Tutor IV 1.0 ... 33

Softlogic Solutions ... NCP

- Disk Optimizer 4.01 (w/Data Guardian) ... 45
- Software Carousel 3.0 ... 49
- FATCAT 1.0 ... 69



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PFS:First Graphics 1.0 ... 89

PFS:First Notes 3.01 ... 99

Professional Write 2.1 ... 139

Professional File 2.0 ... 189

Office Writer 6.1 ... 259

Harvard Graphics 2.12 ... 289

Harvard Graphics Accessories Pk 1.0 ... 289

Harvard Project Manager 3.0 ... 409

Spinnaker ... NCP

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CB-in-1 1.15 ... 39

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Q & A 3.0 (database, word processor) ... 219

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Scrapbook+ 1.0 ... 79

EPS (PostScript) Illustrations ... 79

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- XTREE Pro 1.1 ... 69

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- NetPrint 2.0 (share printers) ... 119

TOPS 2.1 ... 119

TOPS Repeater (extends network) ... 129

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1 yr. w/ry thru PC Connection) 289.

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PC Change.

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First our snow- and ice-covered back roads turn into treacherous trails of mud, virtually overnight. Next, the local teenagers begin walking around with suspicious looks on their faces. But you really know that spring has sprung when our spritely mascots take off their down-filled parkas, flannel shirts, and countless layers of thermal underwear and begin to romp with reckless abandon in the sunlight. Look out!

Go with the flow.

(Or, why the water's no longer over the dam.)

A lot's changed around here since we first began selling products for the PC in 1982. Back then, our warehouse was in a closet, orders were filled by hand, and the dam on the nearby Ashuelot River was badly in need of repair. But even though we now have a much larger warehouse, the most sophisticated order processing system in micro

mail order, and one of the most solid dams in New Hampshire, we're still country boys, girls, (and animals) at heart.

In spite of all our technological prowess, the parking lot still isn't paved, we're still surrounded by acres of forest, and our idea of a power lunch is using the microwave to heat up soup. Which means that the people you talk to when you call us tend to be a little friendlier, a little more laid back, and a little more patient than your average bear.

Get in your licks!

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■ FONT CARTRIDGES

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HP ProCollection Cartridge HP Microsoft Z Cartridge HP S2 Font Cartridge

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As you'd expect, Hewlett-Packard builds its cartridges with excellent materials and fine workmanship, and if you ignore the obsolete B and F Times Roman cartridges, the fonts are among the best you can find for 300-dot-per-inch printing. HP sells cartridges for math and technical uses, cartridges for tax software, and still more cartridges for presentations and correspondence.

The ones that matter most are the \$330 Microsoft Z Cartridge, with Roman-8 character sets of Times Roman and Helvetica in 8- to 14-point sizes, and the \$300 ProCollection Cartridge, which puts portrait Times Roman, Helvetica, Prestige Elite, Letter Gothic, two sizes of Courier, and Line Printer in a single package. The

■ The HP fonts are among the best you can find for 300-dot-per-inch printing.

ProCollection uses only the standard keyboard characters and a few extra legal symbols, so you'll need the Microsoft Z for most serious word processing tasks. The Microsoft Z holds a total of 51 fonts and the ProCollection contains 65—both well within the 68-font safety limit imposed by the LaserJet II.

A NEW ADDITION The new S2 Font Cartridge, shipped with the LaserJet IID printer and available separately at \$300,

has a smaller number of Times Roman fonts than the Microsoft Z, and only one Helvetica font, but adds the full IBM PC character set and the Danish-Norwegian character sets available in the PS/2. Unlike HP's other cartridges, however, it's incompatible with the original LaserJet and LaserJet Plus printers.

Not everything is perfect in HP's cartridge collection. The Microsoft Z, S2, and ProCollection cartridges include 10- and 12-point proportional fonts, but HP's engineers, perhaps out of undue respect for even numbers, didn't notice that in many applications 11-point type is more readable than either. Except for IQ Engineering

ing, every other cartridge vendor has followed HP's even-numbered example. Some of HP's currency symbols look like hastily designed afterthoughts. In the 10-point Prestige Elite font, the hyphen is narrow enough to be mistaken for a dot—clearly an error, not a design decision, because HP got it right in the 7-point size of the same face.

HP's quest for compatibility throughout its line made life difficult for software vendors when the company introduced the Z cartridge and later its upgrade. Arcane problems of compatibility with the original LaserJet led HP to shift every character about one-fiftieth of an inch to the right of its normal position. If you only used the Z fonts, you never noticed, but if you combined Z fonts on the same page with soft fonts and built-in fonts, there were problems with justification, word spacing, and underlining. Most word processors are sophisticated enough to compensate for this. Others are still catching up. The S2 cartridge gets around the problem by not being compatible with the older printer.



FACT FILE



Hewlett-Packard Co. Inquiries
19310 Plunetridge Ave.
Cupertino, CA 95014
(800) 752-0900

HP ProCollection Cartridge

List Price: \$300
Requires: HP LaserJet Plus, Series II, or compatible printer.

CIRCLE 422 ON READER SERVICE CARD

HP Microsoft Z Cartridge

List Price: \$330
Requires: HP LaserJet Plus, Series II, or compatible printer.

CIRCLE 423 ON READER SERVICE CARD

HP S2 Font Cartridge

List Price: \$300
Requires: HP LaserJet Plus, Series II, or compatible printer.
In Short: The HP Microsoft Z and ProCollection cartridges have some of the best proportional-spaced fonts available, and the fixed-width cartridges are the standards. The HP S2 Font Cartridge adds the Danish-Norwegian character sets available on the PS/2. Superb workmanship throughout.

CIRCLE 424 ON READER SERVICE CARD

IQ ENGINEERING

IQ Engineering Super Cartridge 1 IQ Engineering Super Cartridge 2

IQ Engineering was the first company to release an ultracartridge, the classic \$399 Super Cartridge 1. Although IQ is no longer the only player in the field, it probably doesn't have to worry about the competition because its products still tower over the latecomers in quality and innovation.

The new \$699 Super Cartridge 2 does everything that HP and its imitators should have done in a cartridge but didn't. For starters, you get the 11-point Times Roman and Helvetica fonts that are ideal for word processing and desktop publishing applications but omitted from everyone else's cartridges. Furthermore, you get large-size desktop publishing fonts that you normally have to store on acres of disk space: not only Times Roman and Helvetica but also variations on Cooper Black, Broadway, and a Ribbon script font in 14-, 18-, 24-, and 30-point sizes. At the other

The Ultimate Screen Print And Capture Software



Desktop Publishing

- At last! Transfer any image into your favorite desktop publisher including Ventura Publisher, Aldus PageMaker, and Microsoft Word.
- Convert text screens to graphics for use with reports, documents, or manuals quickly and easily.
- Image detail remains sharp and clear when converting color images into black & white with support for up to 256 gray scales.
- Refine and smooth edges for a look that seemed impossible before.



These images were captured with Pizzazz Plus, imported into Ventura Publisher and printed.

IBM PS/2 VGA and MCGA



Pizzazz Plus printed image from an IBM PS/2 VGA.

- Deepen blues, enrich reds, and sharpen greens with on screen VGA 256,000 level color adjustment. Color images are automatically converted to gray scales on screen.
- Go from 4 color printing to full color printing with expanded printer capability.
- Automatically convert text screens to graphics.
- No more printer limitations—what you see on screen is what you'll get on paper.

Professional Printing

- For a print out that doesn't look like it was created with a computer: make circles round and flowers soft with the smoothing feature.
- Choose your own standard of measurement, whether it's inches, millimeters, or points.
- Don't lose the detail when sizing your image up or down—Pizzazz Plus preserves proper aspect ratio.
- Select your print size and position on paper to 0.1°.



Pizzazz Plus printed image from an AT&T Truvision TARGA 16.

Resolves Incompatibility



Pizzazz Plus printed images from an IBM EGA.

- Connect with over 200 printers—that's twice as many as most applications support.
- Capture your screens for easy interchange of popular program file formats such as Splash! by Spinmaker and Publisher's Paintbrush by Z-Soft.
- Fully supports high performance image display boards such as the AT&T TARGA 16, AT&T ICB, and Atrionics PIB.
- Works with virtually all PC DOS applications.

Pizzazz Plus Compatible Hardware

IBM PS/2: Models 25 and 30 (MCGA), and Models 50, 60, and 80 (VGA)
IBM PC, XT, and AT Display Adapter Cards: ATI Technologies' EGA Wonder; Atrionics Professional Image Board (PIB); AT&T Image Capture Board (ICB); Truvision TARGA-16 Hercules Color Card; Monochrome Graphics Card; IBM Enhanced Graphics Adapter (EGA) Color Graphics Adapter (CGA); Plantronics PC+ Colorplus Graphics Adapter; Quadram QuadEGA+; QuadEGA Pro/86; Quadcolor I; Quadcolor II; STB Graphics Plus II; Tecmar Graphics Master; Targ Laboratories EVA; EVA/486; Video-7 Vga EGA; Vega Deluxe; Vision Technologies Vision 16 EV-680
VGA Compatible Adapter Cards: (ONLY Supported in IBM PS/2 VGA Compatible Models) AST VEGA; Compaq VEGA; Orchid Designer VEGA; Paradise Vga Plus Card; Video-7 VEGA Vga
AT&T 6300 Display Adapter Cards: Image Capture Board (ICB); Truvision TARGA 16 DES
PRINTERS: Adobe Systems PostScript; Alps ALJ200 11P and 24 pin; ALJ300 18 and 24 pin; P244WC 18 and 24 pin; ANT Office Printer; Ausable 96230; 9725; 57674; 5702AC; AST TurboLaser/PS; AT&T 477; C. Itoh 1350 Plotwriter; 8510; 8510BP; 8510SC; C-310 CXP; C-315 CXP; C-715A (LQ-1000); CalComp ColorMaster; ColorView 5942; PlotMaster; Canon A1214; P1-1080A; Centronics 230; 260; 338; 339; CIE LIPS II; Citicore 98P-20; NISP-25; Data-products 8400; 8001; 8002; 8010; 8011; 8012; 8020; 8021; 8022; 8023; 8481; 9032; 8070; 8070 Plus (IBM); 8070 Plus (P-Series); 8071; 8072; M-480; P-80; P-132; Diablo C150; Epson DFX-5000; EX-800; EX-800; FX-80; FX-85; FX-86; FX-100; FX-185; FX-286; FX-286C; FX-850; FX-1050; FX-3500; FX-3500 (L-Series); HPS-80; JX-80; LQ-400; LQ-450; LQ-850; LQ-1000; LQ-1050; LQ-1500; LQ-2500; LQ-2500; LQ-500; LQ-500; LQ-800; LQ-800 w/Grayscale; MX-100 w/Grayscale; MX-80; RX-100; SQ-3000; Fujitsu DL2400; DL2500; DL3000; DL3400; DocMate 24C; DPL24C; DX2100; DX2200; Gentecium 1000 (Epson); 1000 (IBM); 3301; Hewlett Packard LaserJet; LaserJet+; LaserJet Series II; Parallel; Thaddeus

(Epson MX-80 Model; IBM Color JetPrinters; Graphics Printer; PC Color Dot Matrix; ProPrinter; ProPrinter XL; Quickwriter 5201-002; IDS Microprint; Prism 80; Prism 132; Infocolor 1280; JDL 850; NEC CP6; CP7; LC-400; P2250; PS-PSXL; PS200; PS300; PS-7; P30XL; Newbury Data OAP-2; OAP-3; Oany LaserPro 810-R; Okidata Laserline 6; Microline 82; 83; 84; 82; Microline (Plug&Play) 82; 83; 84; 92; 93 Microline (IBM) 182; 192; 193; Microline 252; 293; 294; 320; 321; Microline (IBM) 292; 293; 294; 320; 321; 390; 391; 393; Okimate-20; Panasonic KOP-1080; KOP-1091; KOP-1094; KOP-1095; KOP-1096; KOP-1097; KOP-1098; KOP-1099; KOP-1100; KOP-1101; KOP-1102; KOP-1103; KOP-1104; KOP-1105; KOP-1106; KOP-1107; KOP-1108; KOP-1109; KOP-1110; KOP-1111; KOP-1112; KOP-1113; KOP-1114; KOP-1115; KOP-1116; KOP-1117; KOP-1118; KOP-1119; KOP-1120; KOP-1121; KOP-1122; KOP-1123; KOP-1124; KOP-1125; KOP-1126; KOP-1127; KOP-1128; KOP-1129; KOP-1130; KOP-1131; KOP-1132; KOP-1133; KOP-1134; KOP-1135; KOP-1136; KOP-1137; KOP-1138; 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■ FONT CARTRIDGES



FACT FILE



IQ Engineering
P.O. Box 60955
Sunnyvale, CA 94088
(408) 734-1161

IQ Engineering Super Cartridge 1
List Price: \$399; Super Cartridge 1 Enhanced, \$599.

Requires: Any HP LaserJet Series II or compatible printer.

CIRCLE 425 ON READER SERVICE CARD

IQ Engineering Super Cartridge 2
List Price: \$699; Super Cartridge 2L, \$749; Super Cartridge LC, \$399.

Requires: Any HP LaserJet Series II or compatible printer.

In Short: IQ's cartridges surpass everything else on the market. They have the best and richest selection of well-drawn fonts, plus a full set of drivers, superb workmanship, and excellent compatibility. The ne plus ultra of font cartridges.

CIRCLE 426 ON READER SERVICE CARD

end of the scale, you get a full complement of very small fonts ideal for spreadsheet use.

QUALITY WORKMANSHIP IQ's cartridges are the only ones with workmanship even better than HP's. The fonts are beautifully designed, with careful attention to the need for reducing the relative weight of the line at larger sizes. The vendor uses the Roman-8 character set (or a slightly reduced subset for the very largest fonts) and even the full set of PC graphics characters. Math and line-drawing fonts are included, as are accents in different sizes and heights for constructing custom characters.

The special care that went into the Super Cartridge 2 is visible in the fine details

that correct HP's errors. Prestige Elite has a correctly scaled hyphen. Dots and squares are correctly centered on the line. IQ includes exactly 68 fonts—the right maximum for the LaserJet II.

Because IQ's cartridges are highly compatible with HP's, you can use most of IQ's fonts without worrying about special drivers. No other ultracartridges work as smoothly in *Microsoft Windows*. IQ supplies drivers for *WordPerfect*, *Microsoft Word*, *MultiMate*, *XyWrite*, *Nota Bene*, and—unique among cartridges—*Ventura Publisher*, Version 2.0. (Version 2.0 officially supports no cartridges at all, not even HP's; Version 1.1 supported only the bad fonts of the F cartridge.)

The Super Cartridge 2 has only portrait fonts, but you can get the identical fonts in landscape for \$749 in the Super Cartridge 2L, or a smaller set of landscape fonts—all you'll ever need—in the \$399 Super Cartridge LC. The original Super Cartridge 1 corresponds to most of HP's standard cartridges but uses the ASCII character set for the proportional fonts. For \$200 more, IQ will sell you a set of soft fonts that, combined with the Super Cartridge 1 itself, gives you all the fonts that HP offers, including even the bar codes. The Super Cartridge 2 is too advanced for the original LaserJet, but the Super Cartridge 1 works beautifully with all models.

LASER CONNECTION

Laser Connection HP LaserJet Character Font Cartridges

If PC Labs didn't keep impeccable records, I would never have found out that a mysterious set of packages, manuals, and cartridges labeled only as "HP Compatible" and prominently bearing the statement that "Hewlett-Packard is a Registered Trademark of Hewlett-Packard Corp." was really the handiwork of Laser Connection. Had I jumped to the conclusion that these were Hewlett-Packard cartridges, I would have been very much mistaken.

Laser Connection's line of 22 font cartridges ranges in price from \$110 to \$285. We received samples of the P (portrait and landscape Times Roman) and R (Presenta-



FACT FILE



Laser Connection HP LaserJet Character Font Cartridges

Laser Connection
7852 Schullinger Park West
Mobile, AL 36608
(800) 523-2696
(205) 633-7223 (in Ala.)

List Price: 22 font cartridges, ranging from \$110 to \$285 each.

Requires: Any HP LaserJet or compatible printer.

In Short: A line of cartridges that closely mimics HP's standards. Good fonts; not-so-good workmanship.

CIRCLE 427 ON READER SERVICE CARD

tion) cartridges, which cost \$215 and \$285, respectively. The printed fonts closely resemble HP's, but the workmanship isn't equal to HP's luxuriant models.

■ **Laser Connection's** printed fonts closely resemble Hewlett-Packard's, but the workmanship isn't equal to HP's luxuriant models.

When I plugged in one of the Laser Connection cartridges for the first time, the LaserJet II flashed a message saying it needed service—something that never happened with other cartridges I tested. But the car-

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■ FONT CARTRIDGES

tridge worked correctly when I switched the printer off and on again.

If your dealer offers you an "HP Compatible" cartridge, maybe you should ask for an HP cartridge instead.

PACIFIC DATA PRODUCTS INC.

Pacific Data Products 25 Cartridges in One!

Pacific Data Products still sells a \$199 spreadsheet cartridge and a \$149 version of the Microsoft Z cartridge, but the pride of its product line is the \$399 25 Cartridges in One! ultracardridge, which also comes in the new \$499 International Version, and packs more fonts into one package than anything else you can buy.

Pacific Data Products completely redesigned the 25 Cartridges in One! after its initial release, and the current version is an impressive piece of work. The vendor has replaced most of the fonts with clean and legible Agfa Compugraphic designs, although some of the lighter weights still look slightly ragged. The cartridge is compatible with all LaserJets except the origi-

nal model; it is slightly too bulky to work in a LaserJet Plus equipped with certain sheet feeders. Pacific Data supplies drivers for WordPerfect, Microsoft Word, MultiMate, WordStar 2000, and XyWrite. A program on the disk modifies your existing Microsoft Windows driver for reliable access to the Pacific Data Products fonts.

A WIDE RANGE OF FONTS The basic 25 Cartridges in One! model uses mostly ASCII symbol sets in the familiar combinations of Times and Helvetica (8-, 10-, 12-, and 14-point), Letter Gothic, Presentation, Prestige Elite, and various line-drawing and technical fonts. Much more usefully, the International Version includes Roman-8 characters for everything except the Presentation fonts. The original

■ You won't have to apologize for anything you print with UDP's economical cartridges.

version included one Times Roman landscape font; the International Version contains a slightly wider landscape selection.

With its 168 fonts, the International Version gives you a wide range of fonts to choose from at a reasonable price. Although that large a number of fonts in a cartridge should prevent you from using any soft fonts at all in the LaserJet II, Pacific Data Products claims to have discovered an electronic trick that allows you to use 20 soft fonts with the cartridge's 168. The prototypes we examined couldn't do this trick, but the firm promises to have it working by the time you read this review.

UDP DATA PRODUCTS INC.

UDP Font Cartridges

Like some other vendors, UDP Data Products will sell you an equivalent for almost any Hewlett-Packard font cartridge, but it will also sell you cartridges that combine two HP models into one. If you have a one-



FACT FILE



UDP Font Cartridges

UDP Data Products Inc.
1309 Laurel Ave.
Manhattan Beach, CA 90266
(800) 888-4413
(213) 545-5767

List Price: DP1-TMS RMN, Version 1.0, \$379; DP2-HELV, Version 1.0, \$379.

Requires: HP LaserJet or compatible printer.

In Short: Equivalents of HP's line, plus a new desktop publishing series with multiple sizes of one face. Very good type design.

CIRCLE 428 ON READER SERVICE CARD

slot original LaserJet printer or if you want to use your two-slot LaserJet Series II more efficiently, you can purchase one \$239 UDP cartridge with the equivalent of HP's Legal Elite and Legal Courier cartridges, or a \$395 equivalent of HP's Math Elite and Math Times, or half a dozen additional combinations, each at a list price about 20 percent below HP's.

Not content with imitating HP, UDP has begun to release desktop publishing cartridges with many different sizes and weights of the same type family. The \$379 DP1-TMS RMN cartridge has a well-crafted Times Roman font in 8, 10, 12, 14, 18, 24, and 30 points; a version in Helvetica, the DP2-HELV, also costs \$379. The larger sizes come in bold and italic; the middle ones in medium, bold, and italic; and the 8-point in medium only. The symbol set is limited to the ASCII characters on a standard keyboard.

UDP's cartridges aren't packaged expensively, and the manuals are written in a style that can be called utilitarian at best. But the fonts are the product of a good eye for type. You won't have to apologize for anything you print with these economical cartridges.



FACT FILE



Pacific Data Products 25 Cartridges in One!

Pacific Data Products Inc.
6404 Nancy Ridge Dr.
San Diego, CA 92121
(619) 552-0880

List Price: \$399; International Version, \$499

Requires: HP LaserJet Plus, Series II, or compatible; Canon LBP8-II, LBP8-III; or Olivetti PG108 laser printer.

In Short: The newly redesigned 25 Cartridges in One! series has well-drawn fonts in profusion. Good workmanship and drivers.

CIRCLE 428 ON READER SERVICE CARD

AST Takes 33 MHz, 386™ Power One Step Further.



From left to right:
33 MHz, AST Premium 386/33
25 MHz, AST Premium 386/25
20 MHz, AST Premium/386C
16 MHz, AST Premium 386/16
16 MHz, AST Premium
Workstation/386SX

When you buy the 33 MHz, AST Premium® 386/33, you aren't just getting the fastest technology available in a desktop computer. You're getting it AST style.

Which means that in keeping with the AST 386 family tradition, we've packed several speed-enhancing features into the AST Premium 386/33. Such as zero wait-state cache, support for up to 36 MB of memory, support for 80387 and Weitek 3167 coprocessors, 16 ms hard drive access and more.

As a result, you'll be able to tackle a broad range of performance-sensitive and power-hungry applications both in single and multiuser environments, such as 3-D animation, geophysical simula-

tion, regression analysis, CAD/CAM and LAN file service.

And like the rest of the AST 386 family, the AST Premium 386/33 is backed by the same commitment to quality, industry-standard compatibility and support that makes

AST a computer industry leader.

Of course, if you don't need quite so much power, AST offers several high-performance 386 and 386SX™ systems. Such as the 25 MHz, AST Premium 386/25 and the 20 MHz, AST Premium/386C for racing through technical and business applications.

And for an affordable entry into 386-CPU computing, try our true 32-bit, cache-

based 16 MHz AST Premium 386/16 and the small footprint AST Premium Workstation/386SX.

For name-brand systems that provide unbeatable performance, step up to AST. For more information, call us at (714) 863-0181 and ask for operator BB37, or use our Bulletin Board Service Number (714) 852-1872.

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AST
RESEARCH INC.

The Power Of Choice.

AST Premium 386/33	AST Premium 386/25	AST Premium 386/20	AST Premium 386/16	AST Premium Workstation 386SX
51.7	39.4	30.8	23.3	23.2

Landmark Software's 3.11 benchmarks — a generalized index used to compare one machine to another. The higher the number, the better.

We keep telling people
this is not a laser printer.



The new \$995 HP DeskJet PLUS Printer.

But they keep looking at the evidence.



Mr. Arnold R. Jones
230 Bank Street, Suite 945
San Francisco, CA 94104

Dear Reader:

Imagine being able to put out merged text and graphics that look so good, in fact, that your clients will think you're using a laser printer. You can, by using the \$995 HP DeskJet PLUS printer instead.



This is one of many business charts you can print out on the new HP DeskJet PLUS printer. Software for this text and graphics demonstration by Harvard Graphics.

Sincerely,

Alan Grube
Alan Grube



THE TIGER

Tiger! Tiger! Roaring bright.
Were you made by laser light?
No, I'll tell you what made me —
A DeskJet PLUS printer from HP!
(With apologies to William Blake)

MegaCorp 1988 Sales History



You won't believe your eyes (or ears), either. The HP DeskJet PLUS printer gives you the same crisp, black lettering. Clean, sharp graphics. And whisper-quiet operation. But it uses advanced inkjet technology to supply these laser-like qualities for the price of a 24-wire printer.

For just \$995, you get 300 dpi in a trim 15-pound package that's twice as fast as the original. What's more, it has built-in landscape and improved font selection. Including ten built-in fonts and over 100 optional fonts, with sizes up to 30 points. And its 20,000-hour MTBF

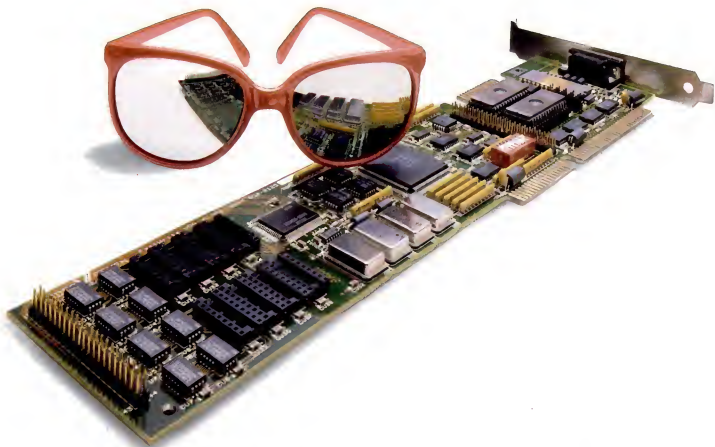
assures a long, happy life.

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nectors as the IBM PS/2 Display Adapter, to accommodate hardware add-ons in the future.

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Of course once you buy, you get free technical support, guaranteed VGA compatibility and a full five-year warranty. All for a price that won't leave you staring blindly into your wallet.

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VIDEO  SEVEN

46335 Landing Pkwy., Fremont, CA 94538. (415) 656-7800.

CIRCLE 127 ON READER SERVICE CARD

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Soft Fonts

LESS PAIN, MORE GAIN



*Until recently,
handcrafted soft fonts
had a reputation
for being difficult to
use. Now, smart
applications can install
these high-quality
fonts automatically,
making it painless
for you to use them.*

IF THE FONT YOU NEED ISN'T BUILT INTO YOUR laser printer, and if you can't find a cartridge that lets you plug it in, you'll need soft fonts. You can create soft fonts with one of the font generators reviewed in this issue. Or you can buy soft fonts already prepared for you by a font vendor in one of the packages reviewed here.

Since a font generator can produce fonts in any point size you need, why buy precooked soft fonts at all?

Two reasons. Quality and price.

When you buy the better-prepared soft fonts, you get fonts that someone has optimized by hand for the best possible print quality. You may have to look closely, but if you compare the Garamond fonts created with Bitstream's *Fontware* font generator to the Garamond fonts handcrafted by Bitstream and marketed by HP, you'll see slightly smoother edges and slightly better consistency in the handcrafted versions. The differences are subtle but unmistakable.

As for price, the best typeface outlines for font generators cost \$195 for a package of four. If the only soft fonts you need are an 11-point Baskerville and a 30-point Helvetica, you can buy them for as little as \$15 each. You can also browse through BBSs and download public-domain fonts that will cost you all of a local phone call.

Unfortunately, a package of the best-prepared fonts tends to cost as much as a package of the best typeface outlines. So if you choose prepared soft fonts, you will probably choose them for reasons of quality or price, but not both.

■ SOFT FONTS

A NEW REPUTATION Soft fonts have a reputation for being overwhelmingly difficult to use. Until recently, that reputation was thoroughly deserved, but smart applications have begun to make the reality differ from the reputation. Smart applications can install fonts automatically (that is, they can get all the information they need for printing from the font files themselves), or they can download fonts automatically when necessary, or both.

With the very smartest applications, all you have to do is copy your fonts into a \FONTS directory (or, for PostScript typeface outlines, a \PSFONTS directory), tell your application the name of that directory, and wait a few moments while the application scans the font files in the directory for information about the size of each character and other technical details. You can then use the fonts with that application as easily as you can use the LaserJet's built-in Courier or the various typeface outlines built into PostScript printers. When you're ready to print, the application will download to the printer any font that you selected in your document.

So far, only one major application, *Lotus Manuscript*, can accomplish every stage of this process automatically for both the LaserJet and PostScript printers. *WordStar*, Release 5.0, comes a close second. It includes a standalone utility for installing both LaserJet fonts and Adobe PostScript typeface outlines. *WordStar* will create a batch file that you can use for downloading fonts before you enter *WordStar*, but *WordStar* won't download fonts by itself.

NOT AS SMART Other applications are smart, but not as smart. Recent versions of the LaserJet driver for *Microsoft Windows* can install fonts, but they won't include the kerning data that you get from third-party font installers. *WordPerfect*, *Microsoft Word*, *Ventura Publisher*, and *Nota Bene* will download fonts when needed—or will offer you the chance to download them when needed—but they can't install fonts by themselves. *WordPerfect*, *Microsoft Word*, *Nota Bene*, and *XyWrite* come with drivers for HP's soft fonts (*WordPerfect* also supports a few LaserJet fonts from other vendors); and *WordPerfect* and *Ventura* come with drivers for Adobe's Post-

Script typeface outlines; but otherwise you generally have to install any soft fonts you buy, either with utilities that accompany the fonts or with third-party utilities.

The main exceptions to this rule are soft-font packages that emulate one of HP's font cartridges. With these packages, you use a supplied utility to download the fonts to the printer, then tell your application that you're using the equivalent cartridge and proceed as if you really did have that cartridge plugged into the printer. Some of these emulations, as pointed out in the reviews, work better than others.

If your prepared fonts don't come with utilities to install them in your applications, all is not lost. SoftCraft's *WYSI-fonts!*, which comes with the *SoftCraft*

■ Soft fonts vary widely in quality from one vendor to another. Homegrown fonts, based loosely on classic designs, often look coarse or crude.

Font Solution Pack, installs any LaserJet font, complete with kerning data and screen fonts, in *Windows* and *Ventura*, and the same vendor's *LaserFonts* and *Laser-Fonts Font Manager* (also included in the *SoftCraft Font Solution Pack*) installs them in *WordPerfect* and *Word*. Agfa Compugraphic and HP's *Type Director* does the same job with *Windows*, *Ventura*, and *Word*, and *WordPerfect* support is on the way. The *Lodestar Utilities* will do the same for *XyWrite* and *Nota Bene*. *Word*, *Nota Bene*, and *XyWrite* do not currently make use of kerning data.

When you install fonts in *Windows*, they are immediately available from any *Windows* application's font menu. With *WordPerfect* you have to go to the Printer menu, select the printer, and then edit the driver to select your new fonts. In *Word*

you have to choose the right .PRD file from the Print Options menu. In *Ventura*, whenever you install new fonts, you first have to use *Ventura's* "Merge new width tables" command to install the width table for the fonts you've added.

You can also install LaserJet soft fonts manually in *Windows* and *Ventura* using a complex series of commands spelled out in the manual. The *Ventura* procedure is especially hair-raising.

MAKE ROOM FOR FONTS Before you can install a soft font, you have to find room for it on your hard disk. This can be more of a problem than it sounds. A 10-point, normal-weight LaserJet text font with the USASCII (low-order) character set can occupy 10K or less. But a 30-point bold font will occupy 70K or more. Extended character sets will double these figures. Although most packages of LaserJet fonts take up about 1MB of disk space, a full family of fonts, like Garamond normal, italic, bold, and bold italic, in ten sizes from 6 to 30 points, can swallow 5 or 6MB in a single gulp. It's not unusual to meet a sufferer from font fever whose hard disk groans under the weight of 40MB of fonts. (A PostScript typeface outline and its associated font-metric file typically require only about 50 to 80K, and you need only one outline for all point sizes. This saves an enormous amount of space.)

Some soft font packages automatically copy a couple of megabytes of fonts to your hard disk and install them all in an application. You can delete the ones you don't intend to use, but uninstalling them, so that they don't appear on the menu, can be trickier. However, SoftCraft's installation utilities can also uninstall fonts on command. Other packages simply give you floppy disks full of font files, and you can copy only the ones you need to your hard disk. If you're willing to live with the inconvenience, you can store all your fonts on floppies and not burden your hard disk. Just tell your applications that your font directory is A:\ and be ready to insert the right disk when needed.

Whether you bother to store a font at all depends finally on whether it's good enough to use twice. Soft fonts vary widely in quality from one vendor to another. Homegrown fonts, based loosely on clas-

sic designs, often look coarse or crude. But even when a vendor offers a font licensed from one of the great type houses like Linotype or International Typeface Corp. (ITC), you still have no guarantee of quality. And when two vendors offer the same licensed font, there may be startling differences between the two versions. Typically, the licensor of a font supplies an "analog" outline drawing of the typeface, and it's up to the licensee to translate it into a digital bitmap. The art of translating an analog to a digital font requires enormous resources of skill and time. Some vendors, unfortunately, rush to market without expending much of either. The results speak for themselves.

Acorn Plus Soft Fonts

If you buy Acorn Plus's \$99.95 print format program *Easy Laser*, you get your choice of a disk full of soft fonts mimicking either Times Roman, Helvetica, or Futura. But *Easy Laser* dates from an era when word processors didn't understand how to use laser printers, and you had to

■ *Acorn Plus Soft Fonts* aren't the most polished you can find, but they all have a distinct and individual style.

type formatting codes into your documents if you wanted to use the features of your LaserJet.

That doesn't make Acorn's soft fonts obsolete. Acorn sells over 500 fonts, ranging from \$2 to \$5 each. For example, \$150 will get you an equivalent of Futura in 11 sizes of seven styles ranging from light and light italic through demibold to bold. A similar set might contain varieties of Helvetica, Times Roman, Eurostyle, Cooper,


FACT FILE



Acorn Plus Soft Fonts
Acorn Plus Inc.
4219 W. Olive Ave.,
#2011
Burbank, CA 91505
(213) 876-5237
List Price: Over 500
fonts available, \$2 to \$5
per font.
Requires: RAM depends on application
used; hard disk; HP LaserJet Plus, Series II,
or compatible printer; DOS 2.0 or later.
In Short: A good range of text and decorative
fonts with individual character. Not copy
protected.
CIRCLE 800 ON READER SERVICE CARD

and somewhat fussy script and decorative faces. For \$60, you can get a set of computer-key symbols in five sizes.

Acorn's fonts aren't the most polished you can find, but they all have a distinct and individual style. The "Tempora" typeface, an equivalent of Times Roman, has a chiseled look more reminiscent of metal type than laser-printed dots. The Futura equivalent uses some well-judged subtleties of line thickness.

When you order Acorn's fonts, be sure to tell the vendor which applications you use. Acorn will supply a simple download utility or a driver for *Microsoft Word*, *WordPerfect*, *PageMaker*, or *Ventura Publisher* on request. Installation is easy; it's simply a matter of copying the fonts and drivers to the right directory. And then you're all set.

Adobe Type Library

Adobe Systems' magnificent library of typeface outlines, the *Adobe Type Library*, is one of the best reasons to own a PostScript printer.


The *Adobe Type Library* comprises 78 packages that range in price from \$95 to \$375. Each package contains one typeface in a variety of weights. Many of the faces are authentic, beautifully realized versions of classic designs. Some, like the Stone and Lucida series, are designed for high clarity on low-resolution printers. A few are silly headline faces like *Hobo*, but no


one's forcing you to buy those.

All Adobe typeface outline packages come with downloading utilities and a simple menu-driven installation program for adding the faces to *Microsoft Windows*, *Ventura Publisher*, or *Microsoft Word*. All you have to do is enter the names of the directories you'll be using and let the installation program copy the outlines to your disk.

If you want to use your desktop printer to print many of the great classic typefaces, like Janson, Caslon, or New Caledonia, your only choice is Adobe. If you want to print with refinements of typographic design otherwise available only on expensive typesetters, your only choice is Adobe. And if you use your desktop printer to prepare pages that you will eventually print on a Linotronic typesetter, Adobe's typeface outlines let you see at 300 dots per inch a close approximation of what the Linotronic will produce at 1,200 or 2,540 dpi.

Still, that doesn't mean that PostScript is always the best choice for desktop printing. At the 300-dpi resolution used by both HP LaserJets and PostScript printers like the Apple LaserWriter, you can get better-looking results from the Hewlett-Packard printer. Because PostScript fonts are generated from the typeface outlines within the printer, there isn't time to fine-tune the


EDITOR'S CHOICE
FACT FILE



Adobe Type Library
Adobe Systems Inc.
1585 Charleston Rd.
Mountain View, CA
94043
(800) 344-8335
(415) 961-4400
List Price: 78 packages
available (each containing one typeface in a
variety of weights), \$95 to \$375 per package.
Requires: 512K RAM; hard disk; Post-
Script printer or typesetter; DOS 2.0 or
later.
In Short: An enormous range of the best
PostScript fonts by far. The latest releases
make serious typography possible on a PC.
Usable only with Adobe PostScript printers.
Not copy protected.
CIRCLE 810 ON READER SERVICE CARD

■ SOFT FONTS

font in the same way that Bitstream's *Fontware* package or Agfa Compugraphic's *Type Director* can fine-tune the bit-map it stores on disk.

But if you choose PostScript for its flexibility and variety, Adobe's fonts are far better than any of the few available alternatives. Adobe encrypts the disk files that contain the typeface outlines and uses proprietary "hints" that allow better-looking type at resolutions below 600 dpi. Non-Adobe PostScript typeface outlines don't

■ If you want to use your desktop printer to print many of the great classic typefaces, like Janson, Caslon, or New Caledonia, your only choice is Adobe.

have anything to match Adobe's "hints," although Bitstream and others are working hard to develop their own equivalents. You can use non-Adobe typeface outlines on both Adobe PostScript printers and those that use PostScript clones (or a LaserJet with a PostScript card plugged into it), but you can use Adobe typeface outlines only on printers, like the Apple LaserWriter, that contain Adobe's PostScript interpreter.

At least 13 Adobe typeface outlines are built into all PostScript printers. Most PostScript printers now have 35, including versions of Times Roman, Helvetica, Palatino, Bookman, Century, and ITC Avant Garde. Although those original typefaces are nothing to complain about, Adobe's recent work displays true typographic excellence. The recent Times Roman Ten soft font, for example, is a more open and readable Times Roman than the one built into Adobe printers, and it's worth taking the extra time needed to download this typeface instead of using the native Times Roman typeface.

But as exemplary as these new fonts are Adobe's most spectacular offering is its new series of Adobe Originals, starting with Adobe Garamond (\$275) and the companion Adobe Garamond Expert Set (\$370). The basic Adobe Garamond uses the standard PostScript character set. The Expert Set adds typographic refinements like ornamental italics, characters with the lighter proportions needed when printing in large sizes, lowercase numerals, small capitals designed to work with ordinary lowercase letters, and additional characters like a numeral "1" that doesn't use extra space to match the widths of the other numerals.

Professional printers have been using refinements like these for centuries, but until now, desktop printers have had to do without them. Adobe Garamond is the most significant advance in desktop typography since the invention of the laser printer.

ConoFonts

Let's take this slowly. *ConoFonts* are soft fonts sold by Conographic Corp., in Irvine, California. You shouldn't confuse Conographic with Agfa Compugraphic, even though Conographic licenses some of its fonts from Agfa Compugraphic. Simple, right?

Nevertheless, if you get confused, you may blame Agfa Compugraphic for the quality of some of Conographic's fonts,

and that would be unfair. The *ConoFonts* versions of Agfa Compugraphic's CG Times and Triumvirate typefaces are darker, rougher, and cruder than the versions of the same faces available from the Font Factory or Qume or those produced by Agfa Compugraphic's *Type Director*. Using the same raw data as the other vendors, Conographic devised fonts in which some vertical strokes are one dot too thick, with the result that some letters look disconcertingly dark.


■ The *ConoFonts* versions of CG Times and Triumvirate are darker, rougher, and cruder than the versions produced by Agfa Compugraphic's *Type Director*.


Conographic currently sells 11 different *ConoFonts* packages; each costs \$125 and contains 25 to 38 downloadable fonts, with sizes ranging from 6 to 30 points. In addition to standard text faces that use the USASCII character set, you can choose symbol fonts and ornamental borders. No downloading or installation utilities come on the disks, but you can buy the *ConoFonts Manager* (also reviewed in this issue) for an additional \$70.

Diplomat Software Series

The *Diplomat Software Series*, from VN Labs, brings foreign-language abilities to word processors, text editors, databases, and other applications that speak only English.

When you load it into memory, the software alters your keyboard so that certain keys or combinations of keys produce on-screen characters in a foreign language. (It is important to note that this requires a

 **FACT FILE**



ConoFonts
Conographic Corp.
1602 Aston St.
Irvine, CA 92714
(714) 474-1188
List Price: *ConoFonts*
(each package contains
25 to 38 fonts; 11 packages
in all). \$125 each.
Requires: 512K RAM; one floppy disk
drive; HP LaserJet or compatible printer;
DOS 2.0 or later.
In Short: Crude, overly dark renditions of
Agfa Compugraphic typefaces. Not copy
protected.
CIRCLE #13 ON READER SERVICE CARD



FACT FILE



Diplomat Software Series
VN Labs
4320 Campus Dr., #114
Newport Beach, CA
92660
(714) 474-6968
List Price: \$23 lan-

guages, each available separately. FX Package (includes Epson FX driver), \$95; NLQ Package (FX Package plus NLQ dot matrix driver), \$165; LaserJet Package (FX Package plus Courier HP LaserJet II driver), \$165; Ventura Package (LaserJet Package plus screen and printer fonts for Ventura Publisher), \$265.

Requires: 64K RAM; one disk drive; Hercules, CGA, EGA, or VGA graphics adapter; any Epson- or IBM graphics-compatible dot matrix printer or any HP LaserJet or compatible printer; DOS 2.0 or later.

In Short: A memory-resident program that inserts foreign characters into files prepared by programs that don't otherwise use foreign characters. Many alphabets available. Available in a special Ventura Publisher version. Not copy protected.

CIRCLE #18 ON READER SERVICE CARD

Hercules, CGA, EGA, or VGA graphics adapter.) When you print the file you're working on, *Diplomat* intercepts it on the way to the printer and inserts foreign characters and accents in the appropriate places. With non-Western alphabets, *Diplomat* lets you switch between the standard English keyboard and complete replacement keyboards. Help screens remind you which key is which. Installation is a simple matter of copying the appropriate files to your hard disk.

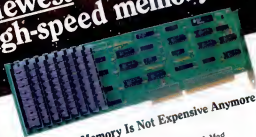
Each *Diplomat* package for the LaserJet costs \$165 and supports only one language. The software works by creating characters that fit into the Courier dot resident in the LaserJet. If you use *Ventura Publisher* with a LaserJet, you can buy a special \$265 deluxe version that includes screen fonts and constructs foreign characters on the fly using almost any of *Ventura*'s built-in proportional fonts. Non-Western alphabets get complete nonproportional fonts of their own.

The *Diplomat Software Series* comprises 23 languages ranging from Arabic

through Greek, Hebrew, Hungarian, and Urdu all the way to Vietnamese. Each package requires all of 64K to run, and cheaper versions are available for dot matrix printers. You probably won't want to

use *Diplomat* with word processors like *Nota Bene* and *WordPerfect*, that have strong foreign-language support built in, but it can be useful for all those less worldly programs that aren't polyglots.

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CIRCLE 177 ON READER SERVICE CARD

■ SOFT FONTS

Elfring Soft Fonts

Elfring Soft Fonts, from the company of the same name (cuts down on letterhead costs), are inexpensive fonts of decent or better quality. From Elfring, you can get any of a dozen standard proportional and fixed-width faces, most of them in normal, bold, and italic styles, in sizes from 6 to 30 points at prices ranging from \$35 to \$60 per set. Twenty-five packages are available in all. Furthermore, bar code 3/9, line-drawing fonts, and large sizes of Times Roman and Helvetica typefaces of up to 50 points are available separately. You can also order Hewlett-Packard DeskJet versions of many Elfring fonts.

Unquestionably, Elfring's best values are its feature-packed symbol collections. A \$40 set includes a version of Helvetica for representing keytops, unaccented Greek, credit card symbols, and dingbats. A deluxe set (at a hefty \$45) includes a full complement of numerals in circles and every dot, arrow, box, and miscellaneous symbol you can possibly imagine.

In addition, a disk full of tiny fonts designed for giant spreadsheets comes with *Lotus 1-2-3* macros that let you select each font without going through the agony of typing in complicated (and often somewhat less than user-friendly) command codes. All of Elfring's disks come with a version of its well-designed *TSR Download* utility, also reviewed in this issue. The fonts themselves are generally com-

pressed within a single executable file that, when you run it, expands into the font files themselves. Installation is up to you.

Fluent Laser Fonts

Everyone else will sell you Times Roman and Helvetica. Casady & Greene offers Dry Gulch, Kells, and a font called Collegiate that looks like the big letter on the back of your sweatshirt.

Casady & Greene's *Fluent Laser Fonts* are PostScript fonts that produce excellent output on 2,540-dot-per-inch Linotronic printers. Because they don't contain Adobe's proprietary "hints," they're less successful when printed in small sizes on

■ **Because *Fluent Laser Fonts* don't contain Adobe's proprietary "hints," they're less successful when printed in small sizes on desktop printers.**

desktop printers. But if you need a Cyrillic PostScript font, Casady & Greene has the only one available for use on IBM machines.

One typestyle in both Casady & Greene's and Adobe's catalogs is Bodoni. At 300 dpi, Casady & Greene's version is acceptable if you imagine it as the product of a rustic print shop. At the same resolution, Adobe's version displays both elegance and strength.

Casady & Greene's fonts are about half the price of Adobe's. The *Fluent Laser Fonts* series comprises 22 volumes; each volume costs \$89.95, usually with four styles of the same face. Screen fonts and width tables for *PageMaker* and *Ventura Publisher* are included, and a simple menu-driven installation program does the heavy labor for you. Casady & Greene also sells the fonts in five collections, each



FACT FILE



Fluent Laser Fonts

Casady & Greene Inc.

P.O. Box 223779

Carmel, CA 93922

(408) 624-8716

List Price: \$89.95 per volume; \$1,000 for all 22 volumes.

Requires: RAM, disk, and DOS requirements depend on application used; PostScript or compatible printer.

In Short: A collection of PostScript outline fonts for headlines and other specialty uses. These fonts look the best at large sizes. Not copy protected.

CIRCLE #12 ON READER SERVICE CARD

containing two to six volumes and ranging in price from \$160 to \$300. The complete collection of 22 volumes costs \$1,000.

The Font Factory Office Series Typefaces The Font Factory Professional Series Typefaces

Each package in *The Font Factory Office Series Typefaces* (23 packages priced from \$99.95 to \$149.95) gives you the soft font equivalent of one of HP's font cartridges. If you already have a cartridge plugged into your LaserJet Plus, or two cartridges in your LaserJet II, the *Office Series* lets you load yet another into the printer's memory. A simple downloader sends the fonts to the printer. No other installation is needed. Simply tell your application that you're using one of the HP cartridges and it'll never know the difference.

Most of the *Office Series* font sets, including those that correspond to the M (Prestige Elite), R (Presentation), and T (Tax) cartridges will fit easily into the memory of any LaserJet that supports soft fonts. But the disk version of the Z1A cartridge needs 800K of printer RAM more than a LaserJet can handle unless you upgrade its memory.

The Font Factory's fixed-width fonts match HP's closely enough that no one



FACT FILE



The
Soft Font
Manual

Elfring Soft Fonts

Elfring Soft Fonts

P.O. Box 61

Wasco, IL 60183

(312) 377-3520

List Price: 25 packages available (each contains one typeface in a range of point sizes), \$35 to \$60 per package.

Requires: 128K RAM; one floppy disk drive (hard disk recommended); HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: Inexpensive fonts, including useful symbols. Not copy protected.

CIRCLE #11 ON READER SERVICE CARD



FACT FILE



The Font Factory
24004 Central Pkwy.
Houston, TX 77092
(800) 44-FONTS
(713) 682-TYPE

The Font Factory Office Series Typefaces

List Price: 23 packages: \$99.95 to \$149.95 each.

Requires: 128K RAM; one disk drive; HP LaserJet Plus, Series II, or compatible printer or Canon LBP8-II; DOS 2.0 or later.

CIRCLE #48 ON READER SERVICE CARD



The Font Factory Professional Series Typefaces

List Price: 20 packages
available for Ventura
Publisher, 20 for Micro-
soft Windows: \$194.95
each.

Requires: 512K RAM; hard disk; HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: Well-prepared and easy-to-install soft font equivalents of HP cartridges, plus text and headline fonts for Ventura Publisher or Microsoft Windows. Use Agfa Compugraphic typefaces. Not copy protected.

CIRCLE #17 ON READER SERVICE CARD

will notice the difference. The proportional fonts like Times Roman and Helvetica use Compugraphic's versions—slightly different designs from HP's, but highly readable when used with HP's width tables.

The Font Factory Professional Series Typefaces (20 packages for Ventura Publisher, 20 packages for Microsoft Windows; each \$194.95) includes Compugraphic and ITC typefaces. Besides the usual desktop publishing typefaces, you can get Baskerville, Garamond, Gill Sans, Avant Garde, Zapf Dingbats (the same font available in PostScript printers) and others. Each package includes normal, bold, italic, and bold italic in sizes ranging from 6 to 30 points, with matching screen fonts. In some packages, that amounts to a rather hefty 2.5MB of fonts. Installation uses an effortless menu-driven program that copies all the fonts to your hard disk whether you want them there or not.

Fontmax

Intercontinental Software Systems' \$129.95 *Fontmax* uses soft fonts and a memory-resident program to add foreign and special characters to *WordPerfect*, Version 5.0. It's a good idea in theory, a less-than-good result in practice.

After being loaded, *Fontmax* adds its own options to *WordPerfect*'s menus. For example, you can switch to a foreign alphabet from the same *WordPerfect* menu you normally use for switching to italic or overstrike modes. The correct character appears on-screen even if *WordPerfect* doesn't officially support it. With an EGA or VGA you can switch between the standard fonts and two *Fontmax* fonts—for example, Greek and Russian. With a Hercules RAMfont card, you can switch among all nine supplied fonts. When using one of the two Hebrew fonts, you can type from right to left—slowly.

Fontmax's fonts (all fixed-width) include business, math, and electrical symbols; Greek, Cyrillic, Hebrew alphabets; and Hiragana and Katakana character sets for Japanese. The characters are no better than utilitarian in appearance, but you can create your own using a font editor supplied with the program.

Fontmax would be a better idea if it worked more smoothly. It replaces all your *WordPerfect* defaults during installation and coexists somewhat shakily with *Word-*

Perfect itself. You have to "initialize" your printer every time you start using the program, and if you want to use any of the standard high-order ASCII characters, you have to disable *Fontmax* entirely.

Your system will crash if it isn't just the way *Fontmax* wants it before installation. One of *Fontmax*'s screens displays its foreign keyboard layout and lets you type a string of characters to insert in your file. The screen tells you to press F7 to exit, but the only way I was ever able to exit from that screen was by pressing Ctrl-Alt-Del.

■ *Fontmax*'s characters are no better than utilitarian in appearance, but you can create your own using a font editor supplied with the program.

If you need to use either of *WordPerfect*'s Japanese character sets, *Fontmax* is the only way to get them. If you need any other nonstandard character sets, you'll find that other font packages will probably make your life easier.



FACT FILE



Fontmax
Intercontinental Software Systems Inc.
3463 State St., #283
Santa Barbara, CA
93105
(805) 964-9671
List Price: \$129.95

Requires: 640K RAM; hard disk; HP LaserJet or compatible printer; EGA, VGA, or Hercules RAMfont adapter; DOS 2.0 or later.

In Short: A complex and somewhat unstable system that uses TSRs and soft fonts to insert foreign and special characters into *WordPerfect*, Version 5.0. Not copy protected.

CIRCLE #18 ON READER SERVICE CARD

Hewlett-Packard Soft Fonts

Like Hewlett-Packard's cartridges, *Hewlett-Packard Soft Fonts* are the standards—the LaserJet fonts most likely to be supported.

With most advanced word processors, HP's fonts need no special installation. Just copy them onto your disk, tell your word processor you have them, and start printing. If you want to install HP's fonts in *Microsoft Windows* or *Ventura Publisher*, you'll have to use a third-party installer or do the job by hand.

HP offers 16 font packages at \$200 each. Fixed-width fonts include sets of

■ SOFT FONTS



FACT FILE



Hewlett-Packard Soft Fonts

Hewlett-Packard Co.
3000 Hanover St.
Palo Alto, CA 94304
(800) 752-0900
List Price: \$200 per set
Requires: HP LaserJet

Plus, Series II, or compatible printer.

In Short: Some of the best available text fonts; among the few soft fonts widely supported by application programs. Not copy protected.

CIRCLE 520 ON READER SERVICE CARD

Letter Gothic, Presentation, and Prestige Elite. Proportional font sets start with Times Roman/Helvetica combinations in sizes from 6 to 30 points and a supplementary set that includes 7-, 9-, and 11-point

sizes—an ideal companion to the even-numbered sizes in the Z1A cartridge. You can buy each set with USASCII or full Roman-8 characters. Although HP doesn't say so, these fonts are hand-tuned versions of Bitstream designs.

Other hand-tuned proportional fonts sold by HP have the Bitstream name on the label. You can choose Garamond, Century, Zapf Humanist, various headline fonts, including sensible large Helvetica fonts, and some silly decorative fonts. Because these fonts are hand-tuned, all look slightly smoother than the versions produced by *Fontware*, and the Helvetica package includes special effects that *Fontware* won't give you at all.

Some of HP's packages contain 3MB of fonts. You don't have to use them all. Each package includes an awkward and elephantine menu-driven downloading utility. But it will deliver the fonts you want to use.

HotType Laser Fonts

PC users once were safe from the kind of circus-poster fonts that thrive like weeds in the Macintosh world. Well, no longer. Image Club Graphics has ported four sets of

■ *HotType's* opening screens warn you that unauthorized duplication is punishable by death!

its *HotType Laser Fonts* typeface outlines to DOS, and now anyone with a PostScript printer and a copy of *Ventura Publisher* can print to their heart's desire in Comic Book, SurfStyle, Chrome Bumper, or



MP386



MP286



MP386s



mp286L



FACT FILE



HotType Laser Fonts
Image Club Graphics
Inc.
1902 11th St. SE, #5
Calgary, Alberta
Canada T2G 1G2
(800) 661-9410
(403) 262-8008

List Price: Four sets available; any one set, \$149; any two sets, \$259; any three sets, \$379; all four sets, \$499

Requires: RAM requirements depend on application used; hard disk; PostScript printer; DOS 2.0 or later.

In Short: Extravagant and amusing headline typeface outlines for PostScript printers. No longer are PC users safe from the circus-poster fonts that thrive in Macintoshland. Not copy protected.

CIRCLE 610 ON READER SERVICE CARD

Compacto Copy. Each \$149 set gives you eight fonts of this ilk. And if one set just isn't enough, you can go ahead and purchase two for \$259, three for \$379, or all four packages for \$499.

On a Linotronic 2,540-dot-per-inch typesetter these fonts can look rather appealing, and some even look moderately dignified. On a 300-dpi printer they won't win any great prizes at below 20 points, but you probably won't want to use these eye-catching typefaces for anything but headlines anyway.

Image Club Graphics conveniently supplies a *Ventura* width table with its fonts and a batch file that puts the fonts in the right directory. If you don't have *Ventura*, well, then you're out of luck. With each set you also get a disk full of useful downloading utilities. Their opening screens warn you that unauthorized duplication is punishable by death—an appropriate warning for a series that includes a

Comic Book font with special characters for printing "THUMP!", "SIZZLE," and "EEEEK!" Holy typeface, Batman!

Laser FontPacks

The worst thing about Eagle Systems' *Laser FontPacks* is the catalog. When you see the poorly reproduced font samples in the catalog, you'll probably get on the phone to some other vendor to ask for a different catalog. Save yourself the phone call.

Eagle Systems' fonts are among the better designs we saw in this roundup. Its version of Times Roman is a carefully balanced, relatively light face that's pleasant to read. One or two minor details, like the bottom serif on the lowercase "s," are misjudged, but you almost need a magnifying glass to notice.

Other fonts in Eagle's repertory are similarly fine. You can choose from the

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**MITSUBISHI
ELECTRONICS**

CIRCLE 368 ON READER SERVICE CARD

Mitsubishi Electronics America, Inc.
Information Systems Division
901 Knox Street, Torrance, CA 90502
Mitsubishi Electric Sales Canada, Inc.
8885 Woodbine Avenue
Markham, Ontario L3R 5G1

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■ SOFT FONTS



FACT FILE

Laser FontPacks, Version 3.3

Fontset #1

Laser Printer
Downloadable Fonts

Eagle Systems
P.O. Box 502
Moorpark, CA 93021
(805) 529-6992
List Price: Six Font-
Packs available, \$99

each. Specific typefaces and point sizes also available, \$5 each.

Requires: RAM requirements depend on application used; one disk drive (hard disk recommended); HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: Well-drawn fonts in a wide range of faces, packaged in convenient sets. Not copy protected.

CIRCLE #14 ON READER SERVICE CARD

standard text and headline faces, plus math, Greek, and script fonts. Six *FontPacks* are available at \$99 per package; each *FontPack* contains a single type fam-

■ Eagle Systems' fonts are among the better designs we saw in this roundup. Its version of Times Roman is a carefully balanced face that's pleasant to read.

ily in normal, italic, bold, and bold italic weights, each in four different symbol sets, at sizes ranging from 6 to 30 points. Specific typefaces and point sizes are also available at \$5 each, and you can buy very large fonts and "specialty fonts" based on faces like Galliard and Futura for \$15 each. Special effects like shaded or patterned fonts are available on special order. Eagle doesn't pack any utilities with its fonts, but the company will sell you a downloader for \$20.

Lines, Boxes, Etc.

WordPerfect's foreign-language and special-character support has odd and annoying gaps. Although *WordPerfect* can distinguish among 1,700 different characters, it can display only a small subset of them on-screen, and it's almost impossible to find fonts for all but the standard Western alphabets.

Three programs try to find their way around these problems: *Fontmax*, *Turbo-Fonts*, and *Lines, Boxes, Etc.* The last-mentioned is the best by far.

Lines, Boxes, Etc., an \$89.95 program from M.A.P. Systems, lets you print virtually the complete *WordPerfect* character set in a 10-pitch or 12-pitch fixed-width font. Depending on which version you buy, you can use the full Hebrew, accented Greek, and Cyrillic alphabets and a few hundred signs and symbols; only a few characters from *WordPerfect's* math set and the full Japanese character sets are lacking. The program also lets you print redlined text with gray shading and gives you a larger choice of line-drawing styles than you get with *WordPerfect's* built-in functions.

You'll appreciate the way *Lines, Boxes, Etc.* does all its magic without forcing you or *WordPerfect* to jump through hoops

and learn three different ways of accessing the keyboard. The installation procedure is a clever *WordPerfect* macro that, unlike the competition, respects your default settings and does little more than install a new printer driver. When the macro is finished, you return to DOS and fire up the memory-

■ You'll appreciate the way *Lines, Boxes, Etc.* does all its magic without forcing you or *WordPerfect* to learn three different ways of accessing the keyboard.

resident portion of the program. If you have EMS memory, this takes only 35K of DOS memory.

You then start *WordPerfect* and use it just as you normally would. The extended character set is accessed exactly as it usually is, through *WordPerfect's* "compose" key or a macro. You can create custom keyboard layouts for the characters you use most often. The program comes with Hercules and EGA/VGA screen fonts that let you see many symbols and the Greek, Hebrew, and Cyrillic alphabets while you work.

Lines, Boxes, Etc. comes with printer drivers that let you continue to use all your standard cartridges and soft fonts. The program itself doesn't use soft fonts. It intercepts your file as it goes to the printer and constructs its special characters as small graphic images that it inserts into the stream of data. The delay in printing is barely noticeable.

If you have a lot of patience, you can use *Lines, Boxes, Etc.* with other applications, but only *WordPerfect* works transparently with it. In addition to the LaserJet/DeskJet version, M.A.P. Systems offers versions for 9- and 24-pin dot matrix printers. You never knew that any of these printers knew so many curious characters.



FACT FILE



Lines, Boxes, Etc.,
Version 2.0
M.A.P. Systems Inc.
1120 NASA Rd. One,
#320
Houston, TX 77058
(800) 527-2851
(713) 333-9640 (in Tex.)

List Price: \$89.95 per package (\$40 for each additional package).

Requires: 128K RAM; one disk drive; any 9-pin Epson, IBM, or compatible printer; any 24-pin printer; or any HP LaserJet, DeskJet or compatible printer; DOS 2.0 or later.

In Short: Of all systems for adding foreign and technical characters into *WordPerfect*, this is the easiest to use. The output produced by this program is excellent. Not copy protected.

CIRCLE #21 ON READER SERVICE CARD

LJ Fonts

Weaver Graphics' catalog of *LJ Fonts* includes 100 packages, each costing \$29.99 and containing one type style in 16 different point sizes. The line includes all standard desktop publishing text fonts, as well as symbols, some notably well-designed script and decorative fonts, and even bar codes. If you want Bodoni, one disk gives you the normal face, and you'll need to buy three more disks for italic, bold, and bold italic. Disks with four larger sizes, from 36 to 72 point, are available at the same price.

LJ Fonts have some obvious rough edges, especially in the italic fonts, but their shapes are clean and unfussy and their proportions are carefully considered. You get a download utility that's no better and no worse than anyone else's, a set of width tables to use for manual installation in your applications, and a program that converts portrait fonts into landscape orientation. These are solid, reliable choices when you need a large set of fonts at a reasonable cost and are willing to install them on your own or with third-party utilities.

And if a quick glance at the catalogue doesn't suggest anything special about the *LJ Fonts* collection, look again. Many of the script and decorative designs have a subtle touch of energy and originality that you won't get from most other font vendors.



FACT FILE



LJ Fonts

Weaver Graphics
Fox Pavilion, Box 1132
Jenkintown, PA 19046
(215) 884-9286

List Price: \$29.99 per package (over 100 packages available, each containing one type style in 16 different point sizes).

Requires: 256K RAM; one disk drive; HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: Very extensive library of soft fonts at a low price. Includes some highly unusual designs. Not copy protected.

CIRCLE 422 ON READER SERVICE CARD



FACT FILE



LTI Softfonts

LTI Softfonts International
14742 Beach Blvd.,
#440
La Mirada, CA 90638
(714) 739-1453

List Price: LTI Specialty

disks (six disks available, each containing 14 fonts), \$99.95 per disk; SoftC "Z" Font Cartridge, \$199.95.

Requires: RAM, disk, and DOS requirements depend on application used; HP LaserJet Plus, Series II, or compatible printer.

In Short: Soft fonts sold either as equivalents of HP cartridges or in packages containing many different faces. One of the best ways to sample a smorgasbord of fonts. Not copy protected.

CIRCLE 423 ON READER SERVICE CARD

LTI Softfonts

LTI Softfonts International offers a choice of six \$99.95 "specialty" disks, each with an intelligently chosen set of different but compatible fonts. Most font vendors sell at most one or two type styles on a disk. LTI routinely offers samples of 14 different typeface families in a single set.

The oldest and most sober of these sets includes text fonts like Times Roman, Optima, Helvetica, and Bookman, in sizes from 6 to 30 points. More-recent disks are more extravagant, generally including script, shadowed, decorative, and white-on-black faces in addition to a sober text face or two. LTI includes width tables and a simple download utility and can supply WordPerfect drivers (but WordPerfect itself now supports LTI's fonts on its disk of third-party LaserJet font drivers).

LTI also offers soft font equivalents to HP's cartridges. These require no special installation for any application that already knows how to use those cartridges. A supplied batch file lets you download these fonts with a single command.

LTI's fonts are readable and well drawn, with smooth curves. The minor flaws in the fonts appear only on close examination. Some characters are too wide for the space allotted to them, resulting in unevenness in character spacing. Other

characters have proportions that don't quite match the rest of the font.

These flaws are easy to live with, however. No one else supplies so much variety at so little cost.

Merlyn Master Fonts

Somewhere among the more than 70 different type styles offered by the Merlyn Software Group is the one that expresses exactly what you feel. Feeling exotic? Well, if so, you might want to try the vaguely Arabic-looking Morocco font in sizes from 10 to 42 points. Or the M*A*S*H font (it looks just like the logo) in point sizes from 12 to 48. You can also choose a Laydown font that consists of Helvetica letters that lie horizontal. Or you can be a bit more conservative and choose a clean, legible spreadsheet font that won't ruffle the auditor's feathers.

Merlyn Master Fonts, which range in price from \$29.95 to \$365, also include a full collection of standard text fonts, mostly in USASCII character sets, but sometimes including convenient legal and foreign characters as well. A \$99.95 "Roman Basic Pak" gives you normal, bold, italic, and bold italic Times Roman in sizes from 6 to 36 points; the 10- and 12-point sizes include characters from the high-order ASCII character set. A second collection, the \$79.95 "Roman F-X Pak," has hollow,



FACT FILE



Merlyn Master Fonts
Merlyn Software Group
2182 Kamridge Rd.,
Suite C
Marietta, GA 30062
(800) 637-5460
(404) 565-8703

List Price: Over 70 packages available, from \$29.95 to \$365 each.

Requires: RAM requirements depend on application used; one disk drive; HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: Well-drawn fonts, witty and serious, in a large library. Includes installation utilities. Not copy protected.

CIRCLE 424 ON READER SERVICE CARD

■ SOFT FONTS

shadow, and reverse shadow Times Roman in 14- to 36-point sizes. And for those who can't decide between the two packages, a "Roman Master Pak" combines all these fonts at \$149.95. The vendor makes it easy to access the special effects fonts by tricking the unsuspecting LaserJet into thinking of them as different weights of the basic font.

The Merlyn Software Group's type designers haven't entirely solved the problem of printing curves on a 300-dot-per-inch printer, but their fonts are among the better-made third-party fonts available for the LaserJet. However, the vendor's utilities don't live up to its fonts. With each font set you get a clumsy program that copies the fonts to your hard disk and an even clumsier download utility. But you get usable *WordPerfect* drivers and *Ventura Publisher* width tables, and drivers for *Microsoft Word*, Version 4.0 and *WordStar 2000*. EGA screen fonts for *Microsoft Windows* or *Ventura Publisher* are available by request or special order.

Qume Downloadable Soft Fonts

The *Qume Downloadable Soft Fonts* are the same well-designed fonts (with easy menu-driven utilities) available from The Font Factory. You can choose from soft

■ Qume offers over 70 different font packages, each containing one typeface in a multitude of point sizes, and sells them at \$95 to \$370 per package.

font equivalents of HP's cartridges (all but the Z cartridge, which Qume doesn't license from The Font Factory) or generally well-designed ITC and Compugraphic



FACT FILE



Qume Downloadable Soft Fonts
Qume Corp.
500 Yosemite Dr.
Milpitas, CA 95035
(408) 942-4000
List Price: Over 70 packages available (each containing one typeface in many point sizes and fonts), \$95 to \$370 per package.
Requires: RAM, disk, and DOS requirements depend on application used; HP LaserJet Plus, Series II, or compatible printer.
Adobe fonts require PostScript printer.
In Short: Repackaged Font Factory fonts and installation programs. Over 70 typefaces available. Not copy protected.
CIRCLE 625 ON READER SERVICE CARD

fonts packaged in kits that install them automatically in *Microsoft Windows* or *Ventura Publisher*.

Qume offers over 70 different font packages, each containing one typeface in a multitude of point sizes, and sells them at \$95 to \$370 per package. So why buy these soft fonts from Qume rather than from The Font Factory? Well, for one thing, when you deal with Qume, you're dealing with a large corporation that will always be there for you, right there in the background. Thus, if you want to feed the corporate LaserJet a rich diet of fonts, you may have an easier time persuading your boss to approve the purchase if you drop the name of a major corporate player like Qume.

SoftCraft Standard Series Soft Fonts SoftCraft Storch Premium Series Soft Fonts

If you prefer to produce fonts with a font generator, SoftCraft produces a licensed version of Bitstream's *Fontware* with more options than Bitstream offers. But if you're looking for specialized fonts that no font generator can give you, SoftCraft's li-

brary of prepared soft fonts is the place to begin.

In its *SoftCraft Standard Series Soft Fonts* line (85 packages in a variety of typefaces and point sizes), SoftCraft has typefaces that represent almost every form of communication except semaphore flags and smoke signals. One font represents the manual alphabet used in sign language. Another has musical notes. A third has the International Phonetic Alphabet. Hebrew, Greek, and Cyrillic are just part of a day's work at SoftCraft. And if you need fonts for Chinese, Japanese, or Persian and are willing to spend some hours organizing them to suit your needs, you can buy a "character database" and a simple font editor that lets you compile the font on your own. When you're through, you can even use the chess symbol font to print out a game. About the only thing the program won't do is challenge you to a game.

All these fonts, like SoftCraft's more conventional Western-language, symbol, and bar-code fonts, cost a grand total of \$15 per package. Some are available with



FACT FILE



SoftCraft Inc.
16 N. Carroll St., #500
Madison, WI 53703
(800) 351-0500
(608) 257-3300 (in Wis.)

SoftCraft Standard Series Soft Fonts

List Price: 85 packages available (each including a variety of typefaces and point sizes), \$15 per package.
Requires: RAM, disk, and DOS requirements depend on application used; HP LaserJet or compatible printer.
CIRCLE 626 ON READER SERVICE CARD

SoftCraft Storch Premium Series Soft Fonts

List Price: 12 packages available (each including a variety of typefaces and point sizes), \$25 per package.
Requires: RAM, disk, and DOS requirements depend on application used; HP LaserJet or compatible printer.
In Short: Serious fonts for business and research, with a few silly fonts also available. Not copy protected.
CIRCLE 627 ON READER SERVICE CARD

auxiliary files that let SoftCraft's *WordPerfect* installation program make the characters accessible as part of *WordPerfect*'s built-in character set—a handy feature that makes using these fonts that much easier.

You'll need either the \$95 *WordPerfect* installer or another of SoftCraft's other font utility programs (described in the review of the *Font Solution Pack*) in order to convert these fonts from a proprietary SoftCraft format into LaserJet format. That's less of a burden than it sounds because SoftCraft's utilities are nothing short of indispensable for anyone who uses soft fonts.

You won't need to go to the trouble of using a utility to convert SoftCraft's new *SoftCraft Storch Premium Series Soft Fonts*. At \$25 per package, these fonts are hand-tuned text and headline faces, some with 3-D or checkerboard effects. The smaller Storch fonts tend to be overly dark, but the headline faces look fine in large sizes. The line comprises 12 packages, each including a variety of typefaces and point sizes.

TurboFonts 512 Plus

It may no longer be accurate to say that *TurboFonts 512 Plus* lets you print any of 2,000 characters using *WordPerfect*. If

past is prologue, Image Processing Software's \$219 utility will probably support 2,100 characters by the time you read this.

TurboFonts 512 Plus includes fixed-width characters for every language that uses the Roman or Cyrillic alphabet, plus Greek with accents and breathing marks and Hebrew and Arabic with all vowels. Scientific and line-drawing symbols are included, and the program comes with *WordPerfect* macros for constructing large

■ **The SoftCraft Standard Series Soft Fonts** line has typefaces that represent almost every form of communication except semaphore flags and smoke signals.

characters needed for equations.

The 2,000 characters that come with the *TurboFonts 512 Plus* package are sized to match the familiar 10-point Prestige Elite font. An optional *Multifonts 512* package (\$150) adds LaserJet soft fonts for 380 characters in normal, slanted, and bold characters in sizes from 6 to 30 points. When you install the program, it creates soft fonts and screen fonts that match the subsets of characters that you intend to use.

TurboFonts 512 Plus has virtually everything you need except convenience. You begin to sense that this program is more complicated than it needs to be when you notice that installation begins with disk 3, then goes forward to 4, then back to 2 and, finally, to 1. *TurboFonts 512 Plus* completely ignores *WordPerfect*'s standard method of accessing foreign characters through either the Compose key or a set of macros and instead imposes an overly complex method of its own. You either toggle between two keyboards via toggle keys that *TurboFonts* usurps from *WordPerfect*, or you press a "dead" key (also

usurped from its normal function) that accesses one of nine additional keyboard layouts and lets you enter characters from that. All these keyboards are stored in the 31K TSR portion of *TurboFonts* that sits above *WordPerfect*.

The installation clears all your default settings and renders all your printer drivers inaccessible, although you can get them back by renaming some files. Unless you intend to use *TurboFonts 512 Plus* every time you use *WordPerfect*, you're better off making a separate copy of *WordPerfect* for use only with *TurboFonts*. Or, if you work extensively with Greek, Hebrew, or Cyrillic alphabets, you may be even better off switching to *Nota Bene*.

VS Collection of FontPaks

VS Software offers well-chosen collections of text and display fonts, all at prices under \$300. Its own homegrown fonts—which range from sober fixed-width fonts through Times and Helvetica to Greek/math, script, and decorative fonts—are well drawn but slightly uneven, except for the thicker decorative fonts. If they don't



FACT FILE



TurboFonts 512 Plus
Image Processing Software Inc.
6409 Appalachian Way
P.O. Box 5016
Madison, WI 53705
(608) 233-5033
List Price: For *Word-*

Perfect 5.0 and LaserJet, \$219.

Requires: 640K RAM; hard disk; Hercules, EGA, VGA, or MCGA graphics adapter; DOS 2.0 or later. Laser versions support HP LaserJet Plus, Series II, or compatible printer.

In Short: An elaborate system for adding foreign and special characters into *WordPerfect*. It works well, but is far more complex than it needs to be. Not copy protected.

CIRCLE 628 ON READER SERVICE CARD



FACT FILE



VS Collection of FontPaks
VS Software
P.O. Box 164038
Little Rock, AR 72716-4038
(501) 376-2083

List Price: Executive

Type Classics FontPak, \$279.95; Executive Headlines FontPak, \$179.95; Designer Collection FontPak, \$219.95; Ventura Supplemental FontPak, \$169.95; Times/Trauminate Combo FontPak, \$169.95.

Requires: 256K RAM; two disk drives (hard disk recommended); HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: VS Software sells decent home-grown fonts and better fonts licensed from Agfa Compugraphic. Extensive installation utilities come with each package. Not copy protected.

CIRCLE 629 ON READER SERVICE CARD

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PCM0005

■ SOFT FONTS

ascend to the top rank of soft fonts, they aren't far below.

Most of the *VS Collection of FontPaks*, like the \$279.95 Executive Type Classics FontPak or the \$219.95 Designer Collection FontPak, come in sets of normal, italic, bold, and bold italic in sizes from 6 to 30 points. (An Executive Headlines FontPak is also available for \$179.95.) Full Roman-8 character sets are included. The vendor also licenses a separate family of Compugraphic and ITC fonts. These are well-rendered versions of 20 familiar

■ All VS soft fonts come with the *VS Laser Word Processor Tool Kit*. The fonts are stored in a compressed format, and you'll need the *Tool Kit* to expand them.

faces, mostly in the same range of sizes and styles as VS's own fonts.

VS combination font sets, like the \$169.95 Times/Triumvirate Combo FontPak, provide mixes of headline faces or text faces at a reduced price. One package, the \$169.95 Ventura Supplemental FontPak, fills out the set of fonts supplied with *Ventura Publisher*, Version 1.1; this additional package isn't needed with Version 2.0 of the program.

All VS soft fonts come with the *VS Laser Word Processor Tool Kit*, reviewed separately in this issue. The fonts are stored in a compressed format, and you'll need one of the programs in the *Tool Kit* to copy them onto your disk and expand them into usable font files. Once the fonts are on your disk, you can install them by using one or more of the *Tool Kit*'s somewhat clumsy menu-driven installation programs for *WordPerfect*, *Microsoft Word*, *Microsoft Windows*, *Ventura Publisher*, or *XyWrite*, but you'll get better results by using an installer from another vendor.

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Sample Resource Histogram

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Sample Rolling Wave Bar Chart

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Sample Resource Usage Bar Chart

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England: 011-44-753-34421.
Germany: (011)-49-6102-17095.

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CIRCLE 191 ON READER SERVICE CARD



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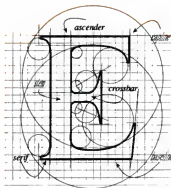
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Font Generators

STARTING *from* SCRATCH



***Font-generating
programs let you craft
the odd font
or symbol that no
vendor has taken the
trouble to create.***

EXPENSIVE PREPACKAGED SOFT FONTS, ELEGANT as they often are, can't do the job when the job requires sizes and typefaces that no one has taken the trouble to prepackage. The solution is a font generator, a rather frightening name for a simple utility.

A font generator creates fonts by transforming raw material called a *typeface outline*. You can't print a typeface outline until you convert it into individual fonts through the magic of a font generator. The outline contains the basic information on the shape and proportion of each character in a typeface—for example, Baskerville Italic. The generator takes that information and "cooks" it until it becomes, say, a 12-point Baskerville Italic font mapped at 300 dots per inch for a LaserJet printer. Depending on the capabilities of the generator, it may also be able to transform that same raw outline into a 100-dpi screen font for display in *Microsoft Windows* or *Ventura Publisher*.

The cooked fonts are bitmap files that are stored on-disk so you can download them to your printer in the same way you download prepackaged fonts. The more-efficient font generators also "install" the fonts in your applications, which means that the generators tell your programs all the information on character size and spacing that the programs need before you can use the fonts. For more information on font installers, see

■ FONT GENERATORS

the reviews of font utilities in this issue.

The swiftest font generators (like SWFTE International's *Glyphix*) skip over the stage of creating font files on-disk and send the fonts directly to the printer. These generators act somewhat like PostScript printers, which generate the bitmap fonts in the printer itself every time you print and don't need a cooked bitmap already on disk.

Digi-Fonts Basic Set

Digi-Duit!, part of the \$89.95 *Digi-Fonts Basic Set*, is a font generator that supports *WordPerfect*, *Ventura Publisher*, *Microsoft Word*, and *Microsoft Windows*. The program comes with eight basic typeface outlines. *Digi-Duit!* creates LaserJet fonts from 3 to 720 points (at 0.1-point increments). It also installs or removes fonts from your applications and lets you use special effects like forward and backward slants, mirror-image fonts, custom shading patterns, and white-on-black type. If eight typeface outlines aren't enough, you can buy *Digi-Fonts Typeface Library* (\$349.95), which includes all of Digi-Fonts' 272 typefaces.

Version 2.0 of *Digi-Duit!* is far more



Digi-Fonts Basic Set, which includes the **Digi-Duit!** font generator, lets you change any attribute of the font you want to create. You can specify the exact character set you need—if you can figure out which hex digits to use to represent the letters and numerals.

flexible than the first version, which merely left you with a disk full of fonts in a character set that no program knew how to use.

The new version features informative menus and fast generation speeds. You have to consult the manual to discover that the Granjon typeface equivalent is face 1283, but at least the program now automatically displays the correct name in the menu after you've chosen it.

pixels on an LED screen), plus a selection of math, technical, and Greek fonts. None of these are unusual. But if you're looking

■ *Digi-Duit!* lets you use special effects like forward and backward slants, mirror-image fonts, plus custom shading patterns and white-on-black type.

for a font that consists of symbols for 40 different kinds of mushrooms, *Digi-Duit!* is your only choice.

FontMaker

The Font Factory's *FontMaker* series of typeface products come in different versions for *Ventura Publisher* (running under *GEM*) and *WordPerfect*; versions for *Microsoft Windows* and *Microsoft Word* are on the way. Each of these font generators is built around a licensed version of Agfa Compugraphic's *Intellifont* technology and uses Compugraphics typeface



FACT FILE



Digi-Fonts Basic Set,

Version 1.5
Digi-Fonts Inc.
3000 Youngfield St.,
#285
Lakewood, CO 80215
(800) 242-5665
(303) 733-8112 (fax)

Colo. 1

List Price: *Digi-Fonts Basic Set* (includes *Digi-Dual*™ font generator and 8 typefaces), \$89.95; *Digi-Fonts Typeface Library* (includes 264 additional typefaces), \$349.95; typefaces can also be purchased in sets of eight, for \$29.95 per set.

Requires: 384K RAM; hard disk; HP LaserJet Plus, Series II, or compatible printer; DOS 3.0 or later.

In Short: More typefaces per dollar than any other package, with fast font generation and installation. Not copy protected.

【例 2-419】海味食品店 2013 年 12 月 31 日结账

NO COMPLAINTS The *Digi-Duit!* symbol sets don't always give you all the special characters that your applications expect, but they come close enough for most practical purposes. If you intend to create a disk-hogging large-size font, you can specify only the characters you need. You can save disk space by sending large fonts directly to the printer instead of saving them in a file.

Best of all, the fonts are often surprisingly good. Compared to the best LaserJet fonts, *Digi-Duit*'s sometimes show slight misproportions between dark and light strokes in smaller type sizes, and their curves aren't as smooth as they might be, but you have to look hard to find something to complain about.

A TREASURE TROVE OF FONTS The price is also hard to complain about. The full library contains an enormous font trove, including most standard serif and sans serif fonts, some good imitation calligraphic oddballs (like a font that imitates

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Andrew Seybold's Outlook on Professional Computing

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—Donald R. Willmet
PC Computing

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—Moody Linnwood
Microcomputing, Nov. 1988

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—John G. Devarak
PC Magazine, Dec. 13, 1988

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—Sally & Daniel Grotts
The Robo Report, Feb. 1989

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—Garry Ray
PC Week

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Prepaid amount enclosed \$

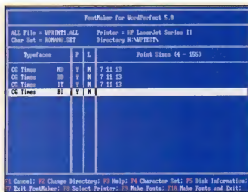
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■ FONT GENERATORS



Each version of FontMaker tries to imitate the keystrokes of the program into which it installs fonts. In this version for WordPerfect, all options are available with a single keystroke.

outlines to create bitmap fonts. Each respective installation kit has the general look and feel of the application in which it installs bitmapped fonts, which means one less set of keystrokes to learn.

FontMaker consists of the *FontMaker Installation Kit*, which costs \$94.95, and the *FontMaker Typeface Families*, which range from \$149.95 to \$215.95. The Font Factory also offers already prepared soft fonts: the *FontMaker Office Series Typefaces*, 23 packages that range in price from

\$99.95 to \$149.95, and the *Professional Series Typefaces*, 20 packages that cost \$194.95 each (both also reviewed in this issue).

The *WordPerfect* version of *FontMaker* supports HP and Canon laser printers and compatibles, as well as the HP DeskJet; the *Ventura* edition works with HP laser and 24-pin dot matrix printers. *FontMaker* gives you the option of using standard ASCII, Roman-8, or legal character sets and adds the new IBM 850 international character set used with PS/2s. It also installs kerning data for each font it creates.

Fonts installed by *FontMaker* produce text that is more widely spaced and therefore marginally less readable than fonts installed by Bitstream's *Fontware*. Expert users can compensate for this in some applications, but it shouldn't be necessary to do so.

The competition doesn't offer font generators with *GEM's* or *Windows*' look and feel, or with the same keystrokes used in *WordPerfect*. If you want these specific features and prefer Compugraphic's type to Bitstream's, *FontMaker* is the package to choose.

Fontware

It's getting more difficult every day to buy a copy of Bitstream's \$95 *Fontware* font-generator and installation kit. That's because the vendors of most major word pro-

cessing and desktop publishing programs have begun falling over themselves to give you a copy.

If you bought the current versions of *Ventura Publisher*, *PageMaker*, *WordPerfect*, *Microsoft Word*, *Lotus Manuscript*, or a few other programs, a copy of *Fontware* either came in the box or was available through a phone call. If you don't have *PageMaker* but want a *Fontware* kit for the *Microsoft Windows* applications that you do have, Bitstream will sell you one for \$95, although the vendor sounds a bit reluctant about it.

STEAL THIS SOFTWARE If you don't have a copy of *Fontware*, get one now. Bitstream's typefaces are consistently the best-designed of all fonts for the *LaserJet*, and they let you put together the most coherent type library. Some of the Bitstream designs even include enhancements added by the creator of the original face.

All *Fontware* kits come with a free sample or two of Bitstream's typeface outlines, usually Dutch and Swiss—pseudonyms for Times Roman and Helvetica. Bitstream is not at all reluctant to sell you additional outlines, which will set you back \$195 per package of four. More than 50 packages are available.

For almost all *LaserJet* printing, *Fontware* and its outlines are all you'll ever need. You can create fonts from all 4 to 144 points in increments of 0.1 point and

PC MAGAZINE FACT FILE



FontMaker
The Font Factory
2400A Central Pkwy.
Houston, TX 77092
(800) 44-FONTS
(713) 682-TYPE

List Price: *FontMaker Installation Kit*, \$94.95; *FontMaker Typeface Families*, \$149.95 to \$215.95.

Requires: 640K RAM; hard disk; Hercules, EGA, or VGA graphics adapter; HP LaserJet Plus, Series II, or compatible printer (*WordPerfect* version also works with HP DeskJet and Canon LBPR-II printers; *Ventura Publisher* version also works with 24-pin dot matrix printers); DOS 2.0 or later.

In Short: Fast font creation and installation using Agfa Compugraphic typeface outlines. Not copy protected.

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PC MAGAZINE EDITOR'S CHOICE FACT FILE



Fontware
Bitstream Inc.
215 First St.
Cambridge, MA 02142
(800) 522-3668
(617) 497-6222 (in Mass.)

List Price: \$95

Requires: 512K RAM; hard disk; PostScript or HP LaserJet or compatible printer, DOS 2.0 or later.

In Short: Bitstream's font generator comes bundled with most major desktop publishing applications and uses the best-designed typefaces available for the *LaserJet*. Not copy protected.

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Fontware's menus are straightforward and easy to use, requiring merely that you press Enter while the bar cursor is over the name of a typeface, then type in the sizes you want. Once you've done that, two more keystrokes begin the font-generating process.

in any of the standard character sets. (For custom character sets, get SoftCraft's licensed version of *Fontware*.) Bitstream's installations produce tight, readable text. The *Windows/PageMaker* installer creates printer fonts for every printer supported by *Windows*, even the humblest dot matrix models. The *Windows/PageMaker* and *Ventura* kits also create screen fonts to match the printer fonts.

NON-ADOBE POSTSCRIPT *Fontware* also creates PostScript outline fonts usable with any PostScript printer. On 300-dpi printers, these outlines are the equal of Adobe's only at large point sizes. At small sizes, Adobe's proprietary "hints" produce far better resolution. But if you use a non-Adobe PostScript printer, you can't use Adobe's fonts, and Bitstream is virtually the only choice you have.

Early versions of *Fontware* were lumbering disk hogs that required you to waste megabytes if you wanted to install fonts in more than one application. Version 3.0, recently released, can create standard-sized fonts in a couple of minutes on an AT equipped with a math coprocessor, and in less than a minute on a 386 machine. The new version also lets you use the same basic generating engine to create and install fonts for different applications.

SIMPLE AS CAN BE For nontechnical users, Bitstream makes the complex job of font making virtually transparent. Bit-

stream assumes that you'll never want to peer behind its simple menus into the dark world of DOS, an assumption that can make life difficult for expert users who want to fine-tune their systems manually.

The problem lies in the way Bitstream names font files. Instead of giving Baskerville files names that begin with letters like "BA," *Fontware* uses arbitrary codes that merely reflect the sequence in which each typeface outline was released. Your Baskerville fonts get names beginning with "DK" ("DL" for Baskerville Italic), so you'll have to haul out the Typeface Key booklet to figure out what they are. Soft-Craft's font-installing programs all come with a BSRENAME utility that lets you rename Bitstream's fonts.

Bitstream's fonts make a lot more sense than their filenames. You can buy splendid digital renditions of Galliard, Garamond, Garamond Condensed, and old-style Goudy—to mention only fonts that begin with one letter of the alphabet. Bitstream Charter is a design optimized for clear printing at the relatively low resolution of a laser printer.

Proportional and monospaced symbols and Zapf Dingbats come in a separate Symbol package, which costs \$195. And you can buy six packages containing four foolish headline faces each, including University Roman, Blippo Black, Hobo, and something called F. T. Bitstream. By the way, please don't use any of these fonts if you decide to write a letter to the editor.

Glyphix

Glyphix, SWFTE International's \$79.95 LaserJet font generator, is unlike anything else on the market—except possibly PostScript.

A *Glyphix* typeface is stored on-disk in the form of a raw outline, not as a set of bit-mapped fonts. When you print with *Glyphix*, the bitmap font that the printer needs resides in your computer's memory and is sent to the printer itself along with the text of your document.

Glyphix, Version 2.0, which was shipping at the time of this review, produces fonts that look decent enough, but they're no match for Bitstream's best. The letterforms are dark and well shaped, but the curves and diagonals have the rough edges characteristic of fonts created on the fly.

You can use *Glyphix* 2.0's real-time font-generating capabilities only with *Microsoft Word*, Version 4.0, and *WordPerfect*, Versions 4.2 and 5.0. You can also redirect *Glyphix*'s fonts to disk if you want to use them like other disk-based soft fonts. Installation kits for *Microsoft Word* and *WordPerfect* cost \$79.95 each; sets of four typeface outlines cost \$99.95, with six sets now available.

FACT FILE

Glyphix
SWFTE International
Ltd.
128D Senatorial Dr.
Greenville, DE 19807
(800) 237-9383
(302) 429-8434 (in
Del.)

List Price: *Microsoft Word Font Installation Kit*, \$79.95; *WordPerfect Font Installation Kit*, \$79.95; *Glyphix Basics Set*, \$99.95; *Glyphix Basics II Set*, \$99.95; *Glyphix Decorative Set*, \$99.95; *Glyphix Book Set*, \$99.95; *Glyphix Sans Serif Set*, \$99.95; *Glyphix Fixed Font Set*, \$99.95.

Requires: 512K RAM; hard disk; HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: Excellent LaserJet fonts generated and downloaded at print time; usable now only with *WordPerfect* and *Word*. Not copy protected.

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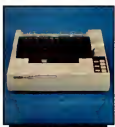
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■ FONT GENERATORS



*Glyphix's
installation kit lets
you specify in
advance the font's
attributes that the program
creates in memory
whenever you print.*

The installation kit lets you combine Glyphix fonts in the same printer drivers with cartridge fonts and other soft fonts, but you can use only the ASCII character set. You have the option of creating stretched or squashed fonts for special effects. Except for a separately available Ro-

relia and transparently.

The forthcoming Glyphix, Version 3.0, which we looked at in its beta release, doesn't require any fussy batch files and removes almost all the limitations of the older version. The kit copies data from the printer driver you normally use into a new Glyphix printer driver, so you can mix any other soft fonts or font cartridges with Glyphix's fonts.

■ *Glyphix, Version 3.0, which we looked at in its beta release, produces remarkably fine type at amazing speeds.*

Glyphix 3.0's "foundry series" fonts (\$89.95 per typeface family) come with true italics and boldface letterforms. The forthcoming version doesn't allow you to slope or squash the original fonts, but that's a small loss. Nor will it let you save fonts to disk. Microsoft Word 5.0 and WordPerfect 5.0 let you choose the color of your type. Glyphix 3.0 interprets color settings as fill patterns: for example, red produces an open outline font, and yellow produces a shaded font.

The forthcoming version produces remarkably fine type at amazing speeds. When you look very closely at the output, you can see that Bitstream's bitmaps are often slightly smoother and more regular, but the difference is impressively small.

If you use a LaserJet Plus, you normally can't use fonts larger than 30 points. Glyphix 3.0 gets around this limitation by optionally creating larger fonts as graphics images. You can't tell them apart from ordinary fonts. With this new version, SWFTE International seems to have thought of every possible convenience.

man Italic font, you don't get any true italic fonts, but rather have to create pseudo-italics by adding a sloping effect to normal characters.

WORKING WITH YOUR WP To use Glyphix 2.0 with Microsoft Word or WordPerfect, you don't simply start up the word processor. Instead, you have to run the word processor under a Glyphix TSR program. You do this by running a WORD.BAT or WP.BAT file from the Glyphix directory, a requirement guaranteed to cause confusion and error. Once you have the program running, however, it works

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MINISTRY OF SILLY FONTS

Now that PC users have outgrown the exclusive use of Courier, Times Roman, and Helvetica, software companies are releasing some of the same silly settings previously available only through Letraset or the type shop. Used with wit and discretion, some of these typefaces work perfectly well. Others are ill used or overused; worst of all, some should never be used. Here are some of the unusual suspects. We've omitted the names of the vendors to protect the guilty.—**Beth Tondreau**

Beth Tondreau is a principal of a New York design studio.

Hobo Roman

ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz

After Johannes Gutenberg invented his craftsmen cast type in hot metal at the time. Today, when type is set mostly by computer, designers design their own fonts, digital typographers design new versions of time-honored designs, sometimes with less-than-

Hobo Roman's lack of typographic proportions gives this face an animated quirkiness. Entire portions of letterforms are misplaced. In most faces, descenders on characters such as "y" or "p" extend below the baseline. Here, the entire letter—descender and all—aligns with the x-height. There is some symmetry in the face; just as the descenders don't descend, the ascenders don't ascend. There are also no straight lines in this face, which makes it inappropriate for serious subjects.

Souvenir

ABCDEFGHIJKLMNOPQRSTUVWXYZ
Zabcdefghijklmnopqrstuvwxyz

After Johannes Gutenberg invented his craftsmen cast type in hot metal at the time. Today, when type is set mostly by computer, designers design their own fonts, digital typographers design new versions of time-honored designs, sometimes with less-than-

Based on a face designed in the '20s, this low-key face has rounded descenders, rounded strokes, rounded bars—and no angles. The only nonrounded part of the character is the stem. Souvenir is probably used more often than most designers would like because it has no sharp edges and won't hurt anyone—except those who prefer clarity in their letterforms.

Tiffany

ABCDEFGHIJKLMNOPQRSTUVWXYZ
WXYZabcdefghijklmnopqrstuvwxyz

After Johannes Gutenberg invented his craftsmen cast type in hot metal at the time. Today, when type is set mostly by computer, designers design their own fonts, digital typographers design new versions of time-honored designs, sometimes

This font has the same fatal flaw as the trendy girls' name Tiffany. At first, it's bearable enough; but all too soon it overwhelms you with its saccharine quality. All of those ersatz calligraphic serifs and swirly spurs give this face a florid look. Even in larger sizes, it's irritatingly cute.

Uncial

ABCDEFGHIJKLMN O P Q R S T U V W
X Y Z a b c d e f g h i j k l m n o p
After Johannes Gutenberg in
type around 1456, craftsmen
metal at their own printing
when type is set mostly by c
printers design their own fo
typographers continue to cr
of time-honored designs, sor

There's nothing basically silly about Uncial. Uncials came into widespread use in the 4th century, when they evolved as a transition between capitals and minuscules (lowercase letters). Difficult to read when set as a text block, Uncial works best in larger sizes or as display. But choose this face thoughtfully, for in an inappropriate context it will look, well, silly.

Park Avenue

ABCDEFGHIJKLMN O P Q R S T U
V W X Y Z a b c d e f g h i j k l m n o p q r s t u v

After Johannes Gutenberg invented movable type in hot metal at their own printing offices, computer and few printers design their own fonts create new versions of time-honored designs, some with less-than-honorable results.

Unfortunately, Park Avenue didn't become extinct when word processors replaced electric typewriters that were equipped with changeable font balls. Certain characters in this face are elegant. But overall, Park Avenue looks like a cheap imitation of a gracefully designed script.

Blippo Black

ABCDEFGHIJKLMN O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z

**After Johannes Gutenberg invented r
1456, craftsmen cast type in hot me
offices. Today, when type is set me
few printers design their own fonts,
continue to create new versions of l
sometimes with honorable, sometime**

Blippo Black nods to Bauhaus type created in 1925. By using lowercase letters only and by treating letters themselves as typographic tools, Bauhaus designers shattered the monotonous gray effect of most existing type pages. Blippo Black is anything but monotonous, with its comparatively large lowercase letters, slanted "s," and round shoulders.

University Roman

ABCDEFGHIJKLMN O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z 1 2 3 4 5 6 7 8 9 0

After Johannes Gutenberg invented movable type in hot metal at their own printing offices, by computer and few printers design their own continue to create new versions of time-honorable, sometimes with less-than-honorable

This face is far too fussy. With its spiky serifs and spidery swashes, it makes you want to rush to a face that's clean and calm.

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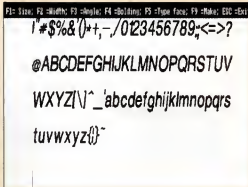
Megafonts

Express Data Lane's \$185 *Megafonts* font generator for *Microsoft Windows*, *Ventura Publisher*, and *WordPerfect* lets you be creative with type in ways that your readers may or may not appreciate.

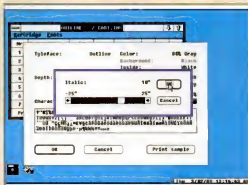
When you create a font, you can specify forward or backward slants, expanded or contracted widths, and exact degrees of bolding. *Megafonts* displays a screen-font equivalent of the printer font as it creates the bitmap, so if you see that you're not getting quite the effect you're looking for on-screen, you can change the specifications and try once again. You don't have to print the results to find out what will appear on the page.

Megafonts' special effects would be more useful if the fonts were better designed. You can use *Megafonts* only with Express Data Lane's proprietary type outlines, and these tend to produce rough-hewn results. The *Times-Romano* counterpart of *Times Roman* isn't all bad, but some of the characters in *Tiffany* (*Tiffany*) look like they have missing pieces even at 14 points, and the *Universio-Romano* looks like something out of a camp horror movie. Eight outlines are available now; Express Data Lane threatens to release many more.

If you keep all your files in directories on the C: drive with exactly the right name, *Megafonts* will work fairly reliably. But if your system is at all customized, you'll



Megafonts displays screen fonts as it creates printer fonts. Pressing a function key brings up a menu that lets you select a typeface outline and specify the basic attributes of the font you want to create.



Outline brings up a window that lets you select special effects and symbol sets for a modified font. In the background is the main window, in which you specify the fonts included in the soft-font equivalent of a cartridge.



FACT FILE



Megafonts
Express Data Lane Inc.
2900 Wilcrest, #425
Houston, TX 77042
(713) 787-0481
List Price: \$185
Requires: 512K RAM,
hard disk; HP LaserJet
3.0 or later.

In Short: A still somewhat rough-edged generator and installer of printer and screen fonts.

You may have to configure its batch files before all the pieces work together. Not copy protected.

CIRCLE 418 ON READER SERVICE CARD

need to spend an hour or two debugging *Megafonts'* maze of batch files to suit your needs.

Outline

German typography got a good start with Gutenberg. SAX Software's *Outline* font generator, modifier, and manager continues the tradition. This \$495 package, distributed in America by Digital Type Systems, runs under *Microsoft Windows* or *DOS* and offers disk-saving ways of managing type that *Windows* users can't get anywhere else.

Outline comes with a handsome set of *Times*, *Helvetica*, and *Symbol* fonts in

standard, even-numbered sizes with full character sets. Other typefaces are available as options. The fonts are packed into highly compressed files that *Outline* decodes when downloading the fonts to the printer. A supplied utility lets you unpack the fonts or pack any other fonts you may have into *Outline's* format.

When you first run *Outline*, you create one or more "soft cartridges." Each soft cartridge consists of a group of fonts that you choose from the fonts supplied. When you're finished selecting fonts, the program downloads them, at a reasonable but not spectacular speed, to the printer. If your printer fonts don't correspond to *Windows'* built-in screen fonts, *Outline* can

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■ FONT GENERATORS


FACT FILE



Outline, Version 2.2
Digital Type Systems
Ltd.
38 Profile Circle
Nashua, NH 03063
(603) 880-7541
List Price: \$495
Requires: 512K RAM;
hard disk; HP LaserJet Plus, Series II, or
compatible printer; DOS 3.0 or later.
In Short: Organizes and customizes sets of
soft-font sets within Microsoft Windows.
Comes with some well-designed fonts that
can be scaled to other sizes. Not copy pro-
tected.
CIRCLE 416 ON READER SERVICE CARD

produce rough but adequate screen fonts while it downloads characters to the laser printer.

MODIFYING YOUR FONTS You can specify that any font be modified in shading, fill pattern, slant, and proportion; turned into a 3-D style; or printed in white on black. Matching screen fonts are created on the fly. None of these screen fonts or

■ **With Outline**, you can specify that any font be modified in shading, fill pattern, slant, and proportion; turned into a 3-D style; or printed in white on black.

modified fonts ever gets stored on disk. *Outline* creates them every time you load a soft cartridge.

Outline can also generate fonts at point sizes not included in the base set, but the results are far too rough to use except for very large headlines.

Once *Outline* has created and down-

loaded a soft cartridge, its fonts are available to any Windows application. It's annoying—but unavoidable—that Windows will let you open *PageMaker* while *Outline* is still downloading fonts but won't let you open a document that uses the fonts until the downloading is complete.

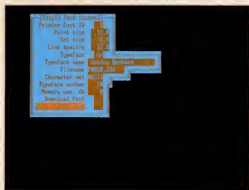
Outline supports *Microsoft Word*, Version 4.0, and *WordPerfect*, Version 4.2, but anyone who uses soft fonts will prefer *WordPerfect*, Version 5.0. Windows is *Outline*'s true environment, and it thrives there.

PrintCon

Jump Ahead Software's \$79.95 *PrintCon* font generator is small and sweet. The program comes on a single disk, complete with outlines for versions of Times Roman, Helvetica, and Bookman, and is accompanied by a tiny manual no larger than the disk. Other outlines will be available at \$29.95.


PrintCon uses a rather laconic and unhelpful menu-driven interface that beeps too often. We saw only a preliminary version of the manual, in which a single page explains how to use the program after installing it. The menus contain a mysterious option or two that don't come with the program. But once you get used to *PrintCon*'s way of doing things, it's a straightforward task to generate, store, and download fonts.

PrintCon doesn't install fonts in appli-



PrintCon's menus all have a similar appearance. You start in the middle of the menu by specifying the typeface name, then work your way up to specify the size, then down again to give the command to create a font.


FACT FILE



PrintCon
Jump Ahead Software
Inc.
P.O. Box 638
Solana Beach, CA 92075
(619) 944-7638
List Price: \$79.95
Requires: 256K RAM;
HP LaserJet Plus, Series II, or compatible,
Okidata Laserline-6, or Ricoh 6000 printer;
DOS 2.1 or later.
In Short: A rudimentary font generator with-
out installation utilities. Not copy protected.
CIRCLE 417 ON READER SERVICE CARD

cations. You'll have to find separate utilities if you want to use these fonts after creating them.

The fonts created by *PrintCon* are well shaped but spindly and rough-textured in a way that doesn't make for easy reading. Jump Ahead promises better outlines by the time you read this—and offers free font upgrades to all registered users.

All in all, *PrintCon* is a compact, promising program that's worth keeping an eye on if you have an interest in desktop typography. Meanwhile, Jump Ahead plans to offer some well-designed headline and display types in the form of cartridges and bit-map fonts. More than 200 faces, some of them unique, will be available before long.

SoftCraft Font Solution Pack

Everything you ever imagined doing with a soft font—and some things you never imagined—can be done, and done to perfection, with SoftCraft's \$495 *SoftCraft Font Solution Pack*.

This extraordinary package combines in a single, integrated environment more than a dozen separate programs for generating, installing, managing, editing, and creating fonts. Every one of these separate programs is either the best of its kind or so close to the best that the difference isn't

■ Every one of *SoftCraft Font Solution Pack's* programs is either the best of its kind or so close to the best that the difference isn't worth thinking about.

worth thinking about. If purchased separately, they cost about \$1,000. In the *Soft-Craft Font Solution Pack*, they cost half that amount and work together smoothly in ways they never worked separately.

The heart of the package is SoftCraft's licensed version of Bitstream's *Fontware* (separately available for \$95). The basic font-generating engine is the same, but SoftCraft lets you choose from a wider range of character sets (and helps you design your own) and lets you customize kerning tables or use well-chosen defaults. Any Bitstream typeface outline works perfectly with the SoftCraft version.

The **WYSIfonts!** installation program (\$95 separately) lets you install or uninstall any LaserJet font in *Microsoft Windows* and *Ventura*, and it creates screen fonts in the process. Other programs (available separately at \$95 and \$180) install and manage fonts for *WordPerfect*, *Microsoft Word*, *WordStar 2000*, and *Office Writer*.

These programs also download fonts and let you preview them on-screen without printing.

MENU-DRIVEN CONTROL You can use the installers with any soft font from any source, not just the ones created by the *Fontware* program. Each installer gives you menu-driven control over many options, including a direct link to SoftCraft's \$95 *Font Effects* program, which lets you create custom variations like shadowed, outlined, and white-on-black fonts or fonts with special fill patterns. You can turn a sober font into a candidate for a circus poster in seconds.

If these effects aren't enough, the package includes the complete \$290 *SoftCraft Font Editor* (reviewed in this issue), which lets you create anything from custom characters to logos or a complete font.

The *SpinFont* program (\$95 separately) lets you manipulate fonts in ways normally available only through PostScript programming or advanced graphics software. You can take any Bitstream typeface outline and create sloped or curved text. For example, a simple menu selection gives you text in the form of a ring. *SpinFont* exports its creations as .PCX or TIFF files for printing in desktop publishing or advanced word processing programs.

ALL THIS AND CONVERSION, TOO

What's more, you get programs for translating portrait fonts into landscape mode.

```

SoC Unit Firmware Initialization Program  VERSION 1.0
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PORT FORMAT: 00 2PORT
SCREEN FORMAT: 00 NONE
RESOLUTION: 03 360 360
SYMBOL SET: 00
SCREEN FILES: 00

C0 I Galliard Aldine 700 1TC Galliard (TM)
C0 I Galliard Aldine 700 1TC Galliard Italic (TM)
C0 I Galliard Aldine 700 1TC Galliard Bold (TM)
C0 X Galliard Aldine 700 1TC Galliard Bold Italic (TM)
F0 E Prestige Fixed Pitch 980 Prestige 12 Pitch/Ten (TM)
F0 E Prestige Fixed Pitch 980 Prestige Italic 12 Pitch/Ten (TM)
F0 E Prestige Fixed Pitch 980 Prestige Bold 12 Pitch/Ten (TM)
F0 X Prestige Fixed Pitch 980 Prestige Bold Italic 12 Pitch/Ten (TM)
T0 A Symbol Font Plus Symbol Font - Proportional (TM)
T0 A Times Batch 001 Roman (TM)
T0 A Times Batch 001 Italic (TM)
T0 X Times Batch 001 Bold (TM)
T0 X Times Batch 001 Bold Italic (TM)

          +-----+
          3   4   5   6   7   8   9   10  11  12  13  14  15  16  17  18  19  20  21  22  23  24  25  26  27  28  29  30  31

```



EDITOR'S
CHOICE

FACT FILE



SoftCraft Font Solution Pack, Version 2.0
SoftCraft Inc.,
16 N. Carroll St., #500
Madison, WI 53703
(800) 351-0500
(608) 257-3300 (in Wis.)
List Price: \$495; now

grams can also be purchased individually: *Font Effects*, \$95; *SpinFont*, \$95; *WYSI-fonts!*, \$95; *Laser Fonts*, \$180; *SoftCraft Font Editor*, \$290; *SoftCraft Fontware*, \$95; *Laser Font Manager*, \$95.

Requires: 512K RAM, hard disk, HP LaserJet or compatible printer, DOS 2.0 or later.
In Short: The best of every kind of font-editing and installation tool for the LaserJet, including a version of Bitstream's *Fontware* font generator that's more customizable than Bitstream's. Not copy protected.

CIRCLE 411 ON READER SERVICE CARD

converting TIFF files to .PCX and back, changing Bitstream's arbitrary font file names to sensible names, and making your software recognize the new names automatically. You also get two dozen well-chosen soft fonts to start with.

If all this is too much, SoftCraft offers a \$295 *Font Special Effects Pack* that omits the font-generating and full font-editing programs. That's still enough to keep you busy for a week merely discovering everything that the package lets you accomplish.

SoftCraft
Fontware, which is
included in the
SoftCraft Font
Solution Pack, uses
the same engine as
Bitstream's
original, but the
control panel offers
far more options
and information.
Every parameter for
font creation can be
changed by making
selections from a
simple series of
menus.

Type Director

Early this year, *Type Director* charged out of its Agfa Compugraphic stable as a chief competitor to Bitstream's *Fontware*. *Type Director* began with a lot of advantages. The \$95 program was faster than Bitstream's similarly priced entry (until Bitstream released its new version), was able to install fonts that it hadn't created, and included a wide variety of useful utilities. Furthermore, behind *Type Director* stood the vast resources of Agfa Compugraphic and of Hewlett-Packard itself, which also

released *Type Director* under its own logo.

Now that the dust has settled, *Type Director* still looks like a major challenger, but not necessarily a triumphant one. As a manager of existing fonts, *Type Director* is clearly more flexible and powerful than *Fontware*, although its clumsy interface and insistent beeping make it a more irritating one. But as a creator of fonts, the two packages have different advantages, and both may be worth owning.

Type Director creates and installs fonts in Microsoft Windows, PageMaker, Ventura, and Microsoft Word. WordPerfect support is promised for the middle of the year. You can create fonts from 4 to 200 points in half-point increments. *Type Director* makes it easy to save disk space by creating only the few characters you intend to use in a very large font. You can use the program to download fonts or to create the width tables that advanced users might need when installing fonts in other applications.

BETTER THAN FONTWARE? *Type Director* and *Fontware* can use only typeface outlines created for each program. You have to pay for *Type Director*; *Fontware* comes free with many applications. *Type Director* creates only LaserJet fonts; Bitstream supports dot matrix and PostScript printers also. You can now buy only 13 packages of four outlines each for *Type Director*, compared with more than 50 four-outline packages from Bitstream.

The \$225 *Debut Edition* of *Type Director* comes with three outline packages. Additional outline packages cost \$195 each.

But the font-scaling technology in *Type Director* seems to be slightly superior to *Fontware*'s. At most point sizes tested, *Type Director* tended to produce smoother curves and diagonals, although Bitstream was better in enough instances to make a

■ Where *Type Director* and *Fontware* use similar rather than identical versions of the same typeface, the *Fontware* face is almost invariably the better designed.

clear decision impossible. Only one typeface, ITC Lubalin Graph, is currently available in supposedly identical forms for both packages, and the *Type Director* version had a generally smoother look.

And yet, where *Type Director* and *Fontware* use similar rather than identical versions of the same face, the *Fontware* version is almost invariably the better designed of the two. Bitstream's Dutch is a more-readable Times Roman than Agfa Compugraphic's unpleasantly dark and narrow CG Times. Bitstream's Century Schoolbook has more character than CG Century.

For some users, *Type Director* has the advantage of working with the same faces found on Agfa Compugraphic's digital typesetters. You can use *Type Director* fonts to proof pages that will be printed on a typesetter, just as you can use Adobe's laser-printer fonts to proof pages that will be printed on a Linotron.

If you don't intend to print on anything more ambitious than a LaserJet, *Type Director* has plenty to offer. It won't make you discard *Fontware*, but it will be a valuable supplement that can sometimes produce superior fonts.



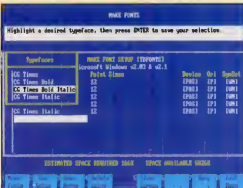
FACT FILE



Type Director
Agfa Compugraphic
90 Industrial Way
Wilmington, MA 01887
(800) 873-FONT
List Price: *Type Director*
(includes two type-
faces), \$95; *Debut Edition*

(includes *Type Director* and 12 typefaces), \$225; *Typeface Volumes* (each containing four typefaces), \$195 per volume.
Requires: 640K RAM, hard disk; HP LaserJet Plus, Series II, or compatible printer, DOS 2.0 or later.

In Short: Uses Agfa Compugraphic typeface outlines to create especially smooth and regular fonts. Extensive installation facilities, awkward interface. Not copy protected.
CIRCLE #18 ON READER SERVICE CARD



Type Director's menus tend to look cluttered even when there isn't much in them, although there's a reasonably logical sequence to the choices. But the program irritates by beeping too often and offering help via the nonstandard F7 key.

**Font
Generators:**

Before you buy

*Now that you've
read the reviews...*

Consult Page 37

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CIRCLE 182 ON READER SERVICE CARD

Font Utilities

FASTER ACCESS, MORE CONTROL



*Timesaving
utilities like font
modifiers, installers,
and downloaders
specialize in
automating one or
more font-
preparation tasks.*

FONT UTILITIES RUN THE GAMUT FROM elaborate font-modification programs through skilled font installers to humble downloaders. If your applications know how to use fonts, and if you intend to use nothing but standard fonts, you may not need any font utilities, but some of them may prove highly convenient.

Even if your applications know how to download fonts, it is almost always faster to download them before you enter the application. Font managers (programs that install fonts into applications) and downloading utilities let you assemble a set of fonts that you can download to the printer via a command in your AUTOEXEC.BAT file. Most of these programs will let you download individual fonts at any time.

Other utilities reviewed here help with installing fonts in applications and in modifying existing fonts without using a font editor. Some of the best utilities of this type are included in the *SoftCraft Font Solution Pack*, reviewed in our article on font generators, also in this issue.

Small utilities that give you technical information about fonts are available on BBSs and information services like CompuServe and PC MagNet. Among the most interesting are *DMPLJFNT*, which prints out the bitmaps of every character in a font; *FONTTABL*, which prints out the size, spacing, and other information about a font; *LISTFONT*, which prints out the full symbol set of the font; and *FINFO*, a small *Windows* program that displays

■ FONT UTILITIES

all the fonts you have installed in *Microsoft Windows*.

Our reviews cover packages devoted primarily to fonts. Other LaserJet control programs not reviewed here offer basic font-management and downloading functions, among them Insight Development's \$150 *LaserControl* ((415) 376-9451), Orbit Enterprises' \$49.95 *E-Z-Set* ((213) 469-3405), and Phoenix Technologies/Softstyle's \$125 *Printworks for Lasers* ((800) 367-5600).

BackLoader

Roxolid's \$29.95 *BackLoader* downloads soft fonts to your laser printer in the background while you get on with your work in the foreground. You can let *BackLoader* do its work quietly from the command line or your AUTOEXEC.BAT file, or you can pop up a small menu window from which to manage your fonts.

The program is designed for use with lists of fonts that you prepare in advance with the help of a well-designed menu that scans your font directory and lets you mark the ones to include in a list.

If you always download the same set of files, this system works well. If you want to load different font files, the program makes matters needlessly difficult. If you can't remember the exact name of the list you want to use, you're out of luck. If you do remember it, you have to remember to precede it with @.



FACT FILE



BackLoader
Roxolid Corp.
3345 Vincent Rd.
Pleasant Hill, CA 94523
(800) 336-7699 for
orders
(415) 256-0105
List Price: \$29.95 (\$5

shipping and handling charge).

Requires: 16K RAM, HP LaserJet or compatible printer, DOS 2.0 or later.

In Short: Memory-resident font downloader that works in the background. Distinguished primarily by its awkward interface. Not copy protected.

CIRCLE 396 ON READER SERVICE CARD

BackLoader's menus and messages can be mildly confusing. When you see a message asking you "Send to the printer?" and the cursor is next to the name of a font file, you might reasonably assume that a Yes answer will send the font to the printer. It won't. It tells the printer to select the font as the default font, something your application should be doing for you.

Downloading fonts in the background can be a timesaver, although the frustration of seeing your foreground work slow down while fonts get downloaded makes it a mixed blessing. You can adjust the balance between *BackLoader*'s background use of computer time and your own foreground use, but you may get better results by installing a fast software print buffer like *LaserTools' Lasertorg*.

BackLoader occupies only 16K of memory and can remove itself from memory when it's through downloading. If you choose to keep it in memory, you can use it to send commands to the printer by popping it up and selecting the command you want from a list in its window. But first you have to look in the printer manual for the right escape codes for each command and write them into an ASCII file for the window to display. At least a built-in menu lets you send a form-feed whenever you need one.

ConoFonts Manager

The *ConoFonts Manager* has some of the clearest menus and the most sensible program logic of any font utility you can find. You don't need to crack the thin manual to select soft fonts and create printer drivers that will let your applications use those fonts. Everything that you see on-screen is lucid and efficient.

Unfortunately, all these virtues are rendered mostly valueless by the limitations of what Conographic's \$70 font manager can actually do. It's designed mostly for installing Conographic's own *ConoFonts* (\$125), although it recognizes standard fonts from other vendors. Its support is limited to *Microsoft Word*, Version 3.0, *WordPerfect* versions prior to Version 5.0, and *WordStar 2000*. The program creates printer drivers that support only soft fonts (hence you can't mix soft fonts and cartridge fonts in the same driver), and it sup-



FACT FILE



ConoFonts Manager
Conographic Corp.
1602 Aston St.
Irvine, CA 92714
(714) 474-1188
List Price: *ConoFonts Manager*, \$70; *ConoFonts* (each package

contains 25-38 fonts, eleven packages in all), \$125 each.

Requires: 512K RAM, HP LaserJet or compatible printer, DOS 2.0 or later.

In Short: A font-installer with exceptionally clear menus. *ConoFonts Manager* can't combine soft fonts and cartridges into one driver, and it supports only older versions of applications. Not copy protected.

CIRCLE 397 ON READER SERVICE CARD

ports only the ASCII character set.

The forthcoming Version 2.0 will be much more agreeable, at least if the beta copy that we looked at matches the version that eventually ships. Although this new version installs fonts in *Word 4.0*, it still hasn't got past *WordPerfect 4.2*, and doesn't support *Microsoft Windows* or *Ventura Publisher*. But it is one of the few installers that bothers to support *MultiMate Advantage II*.

Version 2.0 recognizes all standard symbol sets and can combine soft fonts in the same printer driver with the LaserJet's internal fonts. But it still won't let you combine cartridge fonts with soft fonts in one driver.

The menus in *ConoFonts Manager* are among the easiest to use of any font utility. They deserve to have a more flexible program behind them.

Corel NewFont

Advanced PostScript programmers can take an innocent PostScript font and twist it, shade it, stretch it, run it up a slope, give it a light outline or a dark shadow, and generally make that font wish it had never been born. It may be a good thing for the fonts of the world that the rest of us haven't been able to do that quite so easily.

Until now. Corel Systems' \$185 *Corel*

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MANIPULATING FONTS IN GRAPHICS PROGRAMS

Today's graphics programs let you do a lot more than just print text on a straight line.

With the right graphics package, you can take a few ordinary letters and then, with a few clicks of the mouse, twist, stretch, or rotate them, lay them along a curve, superimpose them over each other, give them thick outlines or gray shadows, and fill them with any pattern you like. When you're through, you can print the result directly from the graphics program or export it as a graphics file to be printed with your word processor or desktop publishing program.

The most stunning and easiest-to-create typographic effects—and the greatest possible variety of typefaces—are built into *Corel Draw*, which runs under *Microsoft Windows*. You may never exhaust the possibilities of the 57 typeface outlines that come with the \$495 program. But if you do, Corel Systems has a new conversion program, which comes with Version 1.02 of the program, that lets *Corel Draw* use any typeface outline sold by Bitstream, Agfa Compugraphic, Casady & Greene, or Digi-Fonts, as well as any outline included in or created by *Publisher's Type Foundry*.

The control that *Corel Draw* affords you over fonts is impressive. With only a few keystrokes, you can command the program to extend one serif while leaving the rest of a character alone. You can turn characters into transparent "windows" over an image. You can also adjust kerning and intercharacter spacing directly on-screen without entering numbers in a dialog box. If you own a PostScript printer, you can fill characters with a few dozen fill patterns. And with any printer you can add any kind of outline or shadow.

Not far behind *Corel Draw* is *GEM Arline* (\$495), which has comparable power to reshape individual characters (and parts of characters), but somewhat less flexibility and range. *GEM Arline* comes with built-in fonts and can use any Bitstream outline.

Computer Support Corp.'s *Arts & Letters Graphics Editor* (\$695) can also reshape anything from text strings to parts of individual characters and alter fill patterns and outlines, but it reads only its own fonts. The less-powerful *Arts & Letters Composer* can modify the overall

shape of characters but can't divide characters into separate elements for editing. Both programs run under *Windows*.

Adobe Systems' *Adobe Illustrator* (\$695), also a *Windows* application, can print text strings with any PostScript font but can modify only characters taken from two special fonts in which each character is stored in the form of clip art. You have to select each character in turn and then manipulate it. *Adobe Illustrator* lets you do this at about half the speed of other graphics packages.

With a clip art font, you have to select and position each character individually. If you're willing to spend the time to do this, one of the best sources of clip art fonts is Micrografx's four-volume *Micrografx Headline Typefaces Library*, which costs \$79.95 for each volume.

Whichever program you choose, remember that your own typographic design skills finally matter more than the power of the program. The most-powerful graphics program can't make a typographic genius out of a typographic bumbler.—Edward Mendelson

PC FACT FILE



Corel NewFont

Corel Systems Corp.
1600 Carling Ave.
Ottawa, Ontario
Canada K1Z 8R7
(613) 728-8200
List Price: \$185

Requires: 256K RAM,
hard disk, Ventura Publisher, PostScript-compatible printer, DOS 2.0 or later.

In Short: The *Corel NewFont* program provides users with menu-driven modifications of PostScript fonts, allowing for an unlimited variety of special effects. The package works with *Ventura Publisher* only. Not copy-protected.

CIRCLE 481 ON READER SERVICE CARD

NewFont gives everyone those transforming powers. It lets you create unlimited special effects with any of the native fonts in a PostScript printer or with any downloadable PostScript font. Using some supplied samples as a guide, you work your way through a menu that specifies all the characteristics of your modified font and then lets you print out normal, italic, bold, and bold italic samples. When you're satisfied with the result, after an hour or two of trial and error, you can install the modified font in *Ventura Publisher* and create a screen font to match.

With type larger than about 20 points, you can achieve some exhilarating effects using a 300-dpi PostScript printer. Anything smaller than that will make your readers wonder whether you like doing bad things to good fonts.

FontTools

If you want to make your readers notice what you have to say, use 2-inch-high characters for headlines. That seems to be the philosophy behind *Worthington Data Solutions*' \$239 *FontTools*, a combination font-downloader and TSR that lets you print enormous block letters on a LaserJet.

Stark, oversize characters like the kind *FontTools* produces—they look like they could be used on a road sign—are almost impossible to find from soft-font suppliers. *FontTools* lets you print them from any application.

To create these oversize fonts, you have to use two of the three products that make up the *FontTools* combination, *FASTfont* and *BIGfont*. The third part, *BARfont*, lets you print every standard kind of bar code, including some that HP's bar-code car-



FACT FILE

Soft Font Tools



FontTools

Worthington Data
Solutions Inc.
417-A Ingalls St.
Santa Cruz, CA 95060
(800) 345-4220
(408) 458-9938 (in
Calif.)

List Price: \$239

Requires: 256K RAM; hard disk; HP LaserJet Plus, Series II, or compatible printer (Graph-Res program, included in the FontTools package, supports any IBM- or Epson-compatible 9-, 18-, or 24-pin dot matrix printer); DOS 2.0 or later

In Short: Memory-resident utilities for printing large letters or bar codes on a LaserJet. Not copy protected.

CIRCLE 404 ON READER SERVICE CARD

tridges can't manage.

FASTfont is a font downloader that knows how to slip past DOS to transfer fonts at top speed. Fast as it is, FASTfont's menus and configuration are so hair-curling complex that you won't want to use FASTfont with anything other than its partner, BIGfont.

BIGfont itself is a combination of soft fonts (which you download with FASTfont) and a memory-resident utility that intercepts text heading for the printer and looks for the control codes that tell the program to substitute large characters for the ordinary-size characters that your application thinks will be printed. You insert these control codes in any document or text file. Any text between the control codes will print in characters ranging from 1/5 inch to 2 inches in size, depending on the code. The whole procedure is much simpler than the manual makes it sound.

Hot Lead Special Edition/PCL

The lead is not merely hot but molten in ISC Industries' *Hot Lead Special Edition/PCL*. This font-modification utility is probably overpriced at \$695, but it gives you fast menu-driven control over transformations that would otherwise require

hours of work in a font editor.

Hot Lead performs standard font-altering tricks without thinking twice. From the densely packed initial menu, you first choose a font file and then select which of a dozen operations you want to perform on it. For each operation, you have to enter the parameters in a menu field—for example, the number of degrees to slope the font. After a few seconds, the font is transformed in memory and you can print a sample or check it on-screen using a fast preview function. If you like the results, you can save the font to disk.

Hot Lead's menu selections let you change the size of a font, stretch or squeeze it horizontally or vertically, slope the characters at any angle, make mirror images, add fill patterns or shadows, put characters in shaded boxes, or combine all these changes into one monstrous new design.

If you need only this set of features, you're better off spending \$600 less on SoftCraft's *Font Effects*. But *Hot Lead* adds other features that almost justify the cost. You can use it to superimpose two characters (or two fonts) over each other in a variety of subtle ways.

Best of all, you can combine characters from up to 20 different fonts into a single composite font. This feature allows you to circumvent the LaserJet II's limit of 16 fonts per page.

Among its many other functions, *Hot Lead* lets you turn fonts into ASCII files in

■ *Hot Lead* allows you to circumvent the LaserJet II's limit of 16 fonts per page.

which the bitmaps are represented by rows of asterisks that you can then edit and turn back into a file. It's not the same as a mouse-driven font editor, but it works.

Laser Word Processor Tool Kit

If you need one package that contains menu-driven or command-line downloaders plus font-installation programs for *WordPerfect*, *Microsoft Word*, *Ventura Publisher*, *Microsoft Windows*, and *XyWrite*, buy any package of VS Software's soft fonts, since the *Laser Word Processor Tool Kit* comes free with every order of fonts. If you don't want the fonts, you can buy this handy set of font utilities alone for \$150.

The *Laser Word Processor Tool Kit* contains some of the best available utilities for downloading fonts manually or automatically, with optional print samples. For this alone, the package will be indispensable to users who experiment with fonts.

The package's menu-driven installation programs for *WordPerfect*, *Word*, *Ventura Publisher*, *Windows*, and *XyWrite* are somewhat less indispensable. You have to type in your font and program directories every time you use them, and you have to specify information about the fonts that the program should be able to ascertain from the font itself.

Furthermore, if you use the program's *WordPerfect* utility to install Garamond, Garamond Italic, Garamond Bold, and Garamond Bold Italic from the same screen, *WordPerfect* won't realize that these fonts belong together. Thus, when you select one of these fonts in *WordPerfect*, the menu will show you four different fonts, all simply named Garamond, and it



FACT FILE



Hot Lead Special Edition/PCL

ISC Industries Inc.
4025 N. Keystone Ave.
Chicago, IL 60641
(312) 286-5600
List Price: \$695

Requires: 512K RAM;

HP LaserJet Plus, Series II, or compatible printer; Hercules, CGA, EGA, or VGA graphics adapter; DOS 2.0 or later.

In Short: This is a highly flexible—but very expensive—font modification program that is just short of a font editor in its functions. Not copy protected.

CIRCLE 399 ON READER SERVICE CARD



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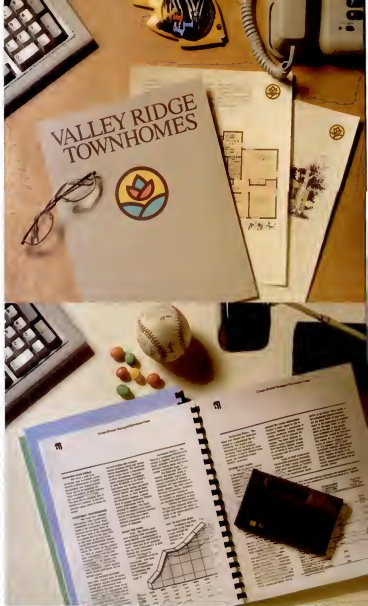
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■ FONT UTILITIES



FACT FILE

Tool Kit

Laser Word Processor

Tool Kit

VS Software

P.O. Box 164038

Little Rock, AR 72216-

4038

(501) 376-2083

List Price: FontGen

IV+, \$250.00; Laser Word Processor Tool Kit, \$150.00 (or free with purchase of any VS Software product); Executive Type Classics FontPak, \$279.95; Executive Headlines FontPak, \$219.95; Designer Collection FontPak, \$169.95; Times/Triumvirate Combo FontPak, \$169.95.

Requires: 256K RAM; HP LaserJet Plus, Series II, or compatible printer (FontGen IV+ also supports Canon, Ricoh, and Cordata laser printers); DOS 2.0 or later.

In Short: Extensive set of font utilities and somewhat inconvenient installers. This tool kit comes with every VS Software font package. Not copy protected.

CIRCLE 405 ON READER SERVICE CARD

becomes a matter of sheer luck whether the one you happen to choose turns out to be normal or bold italic. Experimentation can go too far.

Lodestar Utilities

When you use programs that install fonts in *WordPerfect*, *Microsoft Word*, *Microsoft Windows*, and *Ventura Publisher*, you



FACT FILE

Lodestar Utilities

Lodestar Communications Inc.

P.O. Box 2870

Canoga Park, CA 91306

(818) 340-0807

List Price: \$65

Requires: 128K RAM;

hard disk; HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: An effective utility for installing soft fonts in *XyWrite* and *Nota Bene*. Not copy protected.

CIRCLE 406 ON READER SERVICE CARD

Lodestar Utilities

Lodestar Communications Inc.

P.O. Box 2870

Canoga Park, CA 91306

(818) 340-0807

List Price: \$65

Requires: 128K RAM;

hard disk; HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: An effective utility for installing soft fonts in *XyWrite* and *Nota Bene*. Not copy protected.

CIRCLE 406 ON READER SERVICE CARD

get plenty of helpful menus. Presumably, that's because those applications also give you plenty of menus.

When you use the \$55 *Lodestar Utilities* to install fonts in *XyWrite* and *Nota Bene*, you use the DOS command line. Presumably, that's because *XyWrite* and *Nota Bene* also use a command line. But *Lodestar's* lack of a menu shouldn't bother you: the program is clear and effective without one.

All you do is prepare a list of soft fonts that you want to include in a *XyWrite* or *Nota Bene* printer driver. You then run the installation program with a set of parameters, and the result is a complete printer driver that works just like one of your word processor's own drivers—except that it takes less space and is more efficient. If you combine normal, italic, and bold fonts in your list, the installer is smart enough to write a driver that switches automatically to the italic font when you tell *XyWrite* or *Nota Bene* you want to use italic.

You can combine soft fonts with any HP cartridge fonts in a single driver and can create drivers for any model of the LaserJet that accepts soft fonts, including the new IID. A simple command-line option lets you fine-tune line spacing, a feature you won't find in utilities that install fonts in other programs.

The package adds some useful LaserJet control programs, including one that lets you download fonts from within *XyWrite* or *Nota Bene*. Like *XyWrite* and *Nota Bene*, the *Lodestar Utilities* are swift, efficient, and effective.

Polaris Font Control

Polaris Software's \$99 font installer, *Polaris Font Control*, is a gigantic program with dozens of options, but all its energy, menus, fuss, and fury finally don't amount to much.

Polaris Font Control creates printer drivers only for Versions 3.0 and 4.0 of *WordPerfect* and for *WordStar 2000*. Once you select which of these applications you use, you go to a blank menu that lists 30 available "font screens." You choose one of these screens and start creating a list of fonts.

To accomplish this, you laboriously type in the complex filenames of each of



FACT FILE

Polaris Font Control

Version 2.0

Polaris Software

613 West Valley Park-

way, #323

Escondido, CA 92025

(800) 338-5943 for

orders

Requires: 256K RAM; HP LaserJet Plus, Series II, IID, or compatible printer; Hercules, CGA, or EGA graphics adapter; DOS 2.0 or later.

In Short: Awkwardly designed font manager that makes you do most of the work. Not copy protected.

CIRCLE 407 ON READER SERVICE CARD

Polaris Font Control

Version 2.0

Polaris Software

613 West Valley Park-

way, #323

Escondido, CA 92025

(800) 338-5943 for

orders

Requires: 256K RAM; HP LaserJet Plus, Series II, IID, or compatible printer; Hercules, CGA, or EGA graphics adapter; DOS 2.0 or later.

In Short: Awkwardly designed font manager that makes you do most of the work. Not copy protected.

CIRCLE 407 ON READER SERVICE CARD

your fonts. The program doesn't have the sense to find the filenames for you, but a *Verify* option will let you know if you made any typing errors. If you want to install a font cartridge in the same printer driver with your soft fonts, you have to type in HP's part number for the cartridge.

When you're through, the program creates a printer driver. You can go through

■ If you want *Font Control* to install a font cartridge in the same printer driver with your soft fonts, you have to type in HP's part number for the cartridge.

the whole tedious process once again on another font screen to create another driver. When you want to download the fonts associated with a specific driver, you simply use the driver's number as a parameter on the DOS command line. At least one thing about this program is simple to use.

Soft Font Manager

No font manager is as simple to use or as pleasant to look at as Human Touch Software's \$69.95 *Soft Font Manager*.

By pressing a key or two to make a selection from its main menu, you can tell the *Soft Font Manager* to scan your font directory, display the information you need about the typestyle and size of each font (not merely the uninformative filenames), and store a list of fonts for future use. Another keystroke or two selects a group of fonts for downloading or stores the names of those fonts in a file so that they can be downloaded together. No operation requires even one more keystroke than the absolute minimum.

The only off note in this program is a menu item that offers to delete fonts. No need to avoid this option: it deletes fonts only from the printer's memory, not from your disk.

PC FACT FILE

THE MANAGER

Soft Font Manager, Version 1.4C
Human Touch Software
3050 Fite Circle, #207B
Sacramento, CA 95827
(916) 369-1261
List Price: \$69.95
Requires: 256K RAM;

HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: A font manager and installer that's easy to use. The current version creates drivers for Version 4.0 of *Microsoft Word* and Version 4.2 of *WordPerfect*, both ancient history by now. Not copy protected.

CIRCLE 403 ON READER SERVICE CARD

The version we reviewed could create printer drivers for Version 4.0 of *Microsoft Word* and Version 4.2 of *WordPerfect*,

both ancient history by now. A new version, due around the time you read this, will support Version 5.0 of both programs and add mouse support, keyboard macros, and other new features. The author claims that the new version is even easier to use than the current version. But if it were any easier, you might not even notice that it's there.

TSR Download

TSR Download is an inexpensive little program that does exactly what its name says, either from the DOS command line or from memory. When you let it reside in memory, Elfring Soft Fonts' \$30 utility pops up over your applications and displays a small menu that lists your soft fonts by their obscure filenames. As you move the cursor around the menu, the program displays the name of the typeface (like Helvetica or Times Roman) as well as its



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CIRCLE 504 ON READER SERVICE CARD

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PC
MAGAZINE

EDITOR'S CHOICE
June 10, 1986

DIRECT ACCESS lets you hop over complicated DOS commands, reduces errors, provides complete usage tracking, and secures your data with password protection.



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CIRCLE 236 ON READER SERVICE CARD

DIRECT ACCESS tops all the national best seller charts—it's the ultimate menu system for hard disk management. There's no easier, faster or more organized way to play your software.

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- Call 313-565-4000

Cawthon Software Group
24224 Michigan Avenue
Dearborn, Michigan 48124-1897



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■ FONT UTILITIES

PC
MAGAZINE

FACT FILE

The
Soft Font
Manual

Buy our font

TSR Download,
Version 1.7

Elfring Soft Fonts
P.O. Box 61
Waco, IL 60183

(312) 377-3520
List Price: \$30; with 28
LaserJet soft fonts, \$45;

with 58 LaserJet soft fonts, \$65; with 26
DeskJet soft fonts, \$55; LaserJet Utility Disk
(includes non-TSR shareware version of
Download), \$35.

Requires: 40K RAM, HP LaserJet Plus, Se-
ries II, or compatible or HP DeskJet; DOS
2.0 or later.

In Short: Memory-resident font-downloader
with a good interface and useful features. Not
copy protected.

CIRCLE 298 ON READER SERVICE CARD

size. A single keystroke selects the font for downloading to the printer.

TSR Download's set of features partly overlaps that of Roxolid's *BackLoader* package. As a memory-resident program it swallows 40K of RAM, a much bigger gulp than *BackLoader's* 16K. And **TSR Download** doesn't try to send fonts to the printer in the background. But **TSR Download** is a much more straightforward program to use. It includes a built-in menu of printer controls that will be useful for those troublesome applications that don't know how to control the LaserJet—or for those occasions when you simply wish to copy files to the printer. And if you don't have any soft fonts to download, you can buy **TSR Download** complete with 28 LaserJet soft fonts (Times Roman and Helvetica equivalents in sizes from 8 to 24 points) for \$45 or with 58 soft fonts for \$65.

For those who wish to go beyond the capabilities of **TSR Download**, Elfring also offers a \$35 LaserJet Utility Disk, which has programs to print type samples from soft fonts or display complete technical information about font files. The disk includes the non-TSR shareware version of **Download**, which is available separately for a \$15 registration fee. Yet another \$15 brings you a soft font user's manual that explains the whole subject in clear, easy-to-read English.

OS/2 NEWS

Volume 1, No. 4.

A continuing report on advanced software for personal computers.

Sophisticated reminder system helps you automate your processing tasks.

Enyart Development Corporation has started distributing Ticker/2™. This advanced automated reminder system lets the user create a series of reminders to occur before, during and/or after an event. Ticker/2 can even remind your computer when to perform certain tasks. Because it can be used in conjunction with your data base, spreadsheet, E-mail and project management software, it gives you amazing versatility. For example, you could set up Ticker/2 to take a previously generated sales forecast spreadsheet, update it daily, print a report and electronically mail it to another computer at the end of every week...all while you're on vacation. For more information on the advanced capabilities of Ticker/2 call 1 303 286-8686.

PC Paintbrush now available for Presentation Manager.

The OS/2™ version of PC Paintbrush® uses Presentation Manager™ to make creative expression fun, fast and easy. PC Paintbrush for OS/2 is a graphics creation package that includes all the features of the DOS-based version. It lets you create intricate free-hand graphics using the various brushes, lines, curves, colors and patterns. You can also use scores of drawing and text tools to create presentation-quality documents. For more information call ZSoft at 1 404 428-0008.

Word processing that goes beyond just words is introduced for OS/2.

DisplayWrite 5/2 Composer™ has been released by IBM. This advanced word processing software lets you scan photos and line art into your document, position them anywhere on the page, even make text flow around them...all without cutting or pasting. DisplayWrite 5/2 Composer capitalizes on the protected mode and multitasking capabilities of the IBM OS/2 environment so you can run it as a foreground or background operation. See your IBM Authorized Dealer or IBM marketing representative for complete information.

New relational data base system helps PC users handle large volumes of data.

R.BASE® is an easy-to-use OS/2 relational data base management system that features both menu and command-line interfaces. And because it includes LAN support for up to three simultaneous users (using the multitasking and networking support enhancements of OS/2), it's cost-effective as well. R.BASE also provides programming language support, and over 70 business and scientific functions are already integrated into the program. For more information on how R.BASE can help you manage large volumes of data call MICRORIM at 1 800 624-0810.

Symantec's Q&A provides powerful file management for OS/2.

Q&A™ is an integrated flat-file data base and word processor that offers OS/2 users a unique combination of power and simplicity. With Q&A you can take advantage of OS/2 benefits like multitasking and large memory. Q&A OS/2 also offers the ability to share data bases on a network with the DOS version of Q&A. Multifile lookup in Q&A means you can merge data from multiple Q&A data bases into customer-designed forms and reports. Q&A's executive word processor lets you create presentation-quality documents and easily perform mail merge with your data. For more information on how Q&A can solve your data base and word processing needs call 1 408 253-9600.



OS/2-based Platinum provides true multitasking accounting packages.

The Platinum® Series of fifteen accounting modules from Advanced Business Microsystems is a business accounting tool so powerful that on a single computer you can print and post several hundred invoices and checks, run a reconciliation, generate consolidated financial statements—and enter new budget figures at the same time. Platinum also makes it easy for you to integrate your accounting data with data bases, spreadsheets, presentation graphics, word processing, desktop publishing and other applications. For more information on Platinum call 1 800 999-1809.

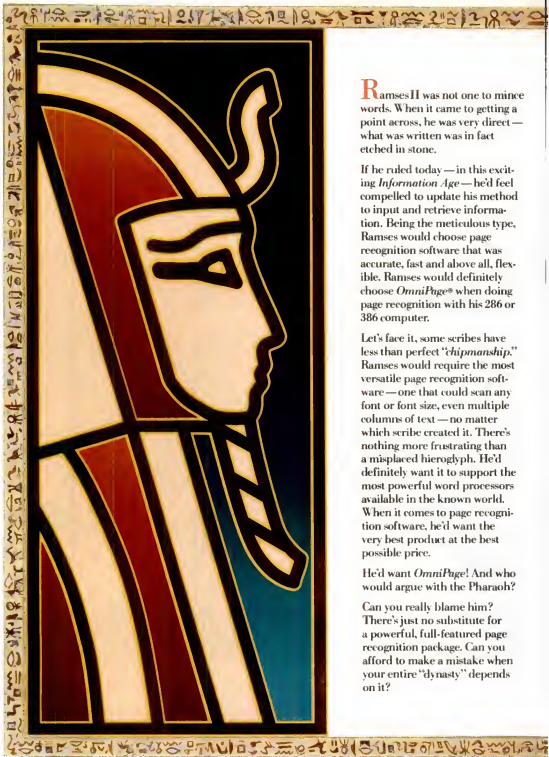
Free OS/2 Application Guide available.

You can receive a 340-page OS/2 Application Guide that lists and describes over 800 identified applications for the OS/2 operating system. For a free copy of this guide call 1 800 IBM-2468, ext. 120.



Microsoft®

IBM®



Ramses II was not one to mince words. When it came to getting a point across, he was very direct — what was written was in fact etched in stone.

If he ruled today — in this exciting *Information Age* — he'd feel compelled to update his method to input and retrieve information. Being the meticulous type, Ramses would choose page recognition software that was accurate, fast and above all, flexible. Ramses would definitely choose *OmniPage*® when doing page recognition with his 286 or 386 computer.

Let's face it, some scribes have less than perfect "*chipmanship*." Ramses would require the most versatile page recognition software — one that could scan any font or font size, even multiple columns of text — no matter which scribe created it. There's nothing more frustrating than a misplaced hieroglyph. He'd definitely want it to support the most powerful word processors available in the known world. When it comes to page recognition software, he'd want the very best product at the best possible price.

He'd want *OmniPage*! And who would argue with the Pharaoh?

Can you really blame him? There's just no substitute for a powerful, full-featured page recognition package. Can you afford to make a mistake when your entire "dynasty" depends on it?

So It Is Written... So It Shall Be.

Means that OmniPage/386 can read virtually any font, in sizes that range from 8 pt. to 72 pt.

This unique landscape feature means that spreadsheets and financial documents are only a scan away. A great addition to your royal granary if storing and accessing numerical data really counts!

With OmniPage/386 all that is required is the software — no add-on boards — this translates into recognition power at a fraction of the price.

Transitional Editor™ lets you edit scanned text — without leaving the program — before exporting it to a file. Cut, copy, paste, insert and delete text — or take advantage of the powerful search and replace tools which allow you to modify a page.

Reads and outputs underlines, bold faces and italics.

Supports the most popular word processing, spreadsheet and data base programs.

Supports 11 of your favorite Indo-European languages, including French, German and Spanish.

WYSIScan™ interface takes full advantage of the Windows environment — an excellent compliment to any AT or 386 machine.

OmniPage/386 has even more features than ever before — which translates into the most comprehensive page recognition software available — anywhere — for any dynasty — at any price.

Partial Page allows you to scan only that text which is relevant to your business needs.

The bottom line in page recognition software — eliminating excessive key strokes* for all time.

Now... OmniPage/386 software only!



*Egyptian scribes had a real time of it when it came to excessive key strokes. Each letter, or hieroglyph, had to be individually etched into stone. And we complain today about writer's cramp?

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CAERE

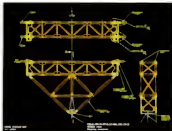
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100 Cooper Court
Los Gatos, CA 95030
1-800-535-SCAN

The power and performance of big-system CADD...MicroStation PC

How MicroStation works for Teledyne Brown Engineering

Teledyne Brown, an Intergraph customer, is the payload mission integration contractor for George C. Marshall Space Flight Center. Teledyne Brown ensures the successful integration of scientific experiments with the space shuttle orbiter and the Spacelab module, including subsystems.

The compatibility of MicroStation PC with Intergraph's other software offerings allows Teledyne Brown to transfer projects in various stages between the VAX and MicroStation until payload integration is complete.



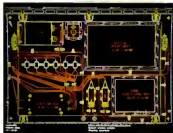
Multi-Purpose Experiment Support Structure (MPESS) carries a wide variety of scientific experiments into space.



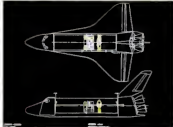
Materials Science Laboratory (MSL), attached to the support structure, shown on MicroStation PC



Shaded image of a completed MSL payload on the shuttle



Detail of MSL, shown on MicroStation PC



MSL payload in position on the shuttle, shown in 2D on MicroStation PC

Powerful graphics

A true 3D PC CADD package, MicroStation performs shading and hidden line removal. Undo/Redo, DXF In/Out, Linear/Area Patterning, and B-splines are just a few of the hundreds of commands that help you enter, manipulate, view, and store a wide variety of designs.

Speed and ease of use

MicroStation is one of the fastest PC CADD solutions available, and it's extremely easy to use. It was created for design and drafting — even large-scale, production-size files — without additional hardware.

Flexibility

Up to 32 reference files can be attached to the active file for scaling, rotating, or clipping. MicroStation features dynamic update which allows you to see all the characteristics of the element before placement — minimizing errors and time-consuming corrections.

Growth

Designs created with MicroStation are compatible with Intergraph's VAX and UNIX applications — providing an inexpensive entry into our broad range of systems without the usual file translation problems of other software packages.

Quality. Reliability. Performance.

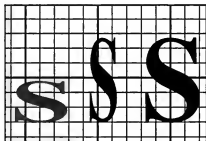
See for yourself. Call for more information or for a referral to the MicroStation reseller or education center nearest you.

INTERGRAPH

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In Alabama only, call 800-345-0218.
Outside the U.S., call 205-772-1800.
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Font Editors

NEW LIFE *for* OLD FONTS



*More than any
other utility, font editors
let you control your
own letterforms, allowing
you to create
new ones or modify the ones
that already exist.*

AY THE FONTS YOU BUY DON'T have the characters you need. Or you want to design new letterforms for a

company logo or even a whole new font. Or you simply can't stand the shape of the tail on the uppercase Q in the font you use all the time. You need a font editor.

Font editors are the ultimate font utilities. With any of them, you can modify a LaserJet font or create an entirely new one. All let you superimpose one character over another and combine characters from different fonts. Some of them let you modify or create screen fonts; some let you tinker with images; and one lets you create PostScript-compatible outlines. But all of these font-editing packages are professional tools and therefore must be used with professional care. In unskilled hands, they

■ FONT EDITORS

can transform a normal, healthy-looking font into a grotesque absurdity.

FontCenter ProFont System

The *FontCenter ProFont System* was the first full-featured font editor for the PC, and many loyal users still call it by its original name, *Poems*. In many ways, FontCenter's \$300 ProFont Editor is the *WordStar* of font editors. It doesn't look pretty and it doesn't have the slick features of the chrome-plated newcomers, but it works at top speed and has an interface that lets you finish a lot of work with a few keystrokes. The program recently added mouse support, but it's still highly effective even if you don't use that device.

The editing screen lets you hide or display a grid and work in normal or reverse video. A simple press of a function key determines whether cursor movement writes, erases, or simply moves from one point to another. Function keys are used to activate the cursor to create lines or boxes, to move part or all of a character, and to replicate and delete rows and columns of dots.

Quick two-letter commands let you read characters from a file, merge characters from a second "reference font," or resize, invert, embolden, and slant individual characters or groups of characters. You can zoom in to a character at 3 degrees of magnification, and a simple preview function lets you see how characters will look when printed next to each other.

The *ProFont* editor creates and modifies fonts in its proprietary editing format only. You have to convert LaserJet fonts into this format for editing and back again to use them, but you can also edit any of the font formats for which FontCenter provides conversion programs.

FontGen IV+

VS Software calls *FontGen IV+* its "workhorse editor." This \$250 package is a workhorse capable of heavy-duty font editing, although it lacks the convenience and clarity of newer programs like the *Soft-Craft Font Editor* and *Publisher's Type Foundry*. But by the time you read this, a new version, *FontGen V*, may have been



The ProFont Editor, which is part of the FontCenter ProFont System, uses simple keyboard commands for editing characters. For example, a simple two-letter command will convert the editing screen to black on white.



The menus and commands in FontGen IV+ are less complicated than they look. Press one letter to bring up a submenu, then a second letter to give a command. Once you learn the syntax, you can press both letters without looking at the menus.

released with features that the other programs don't have yet, such as a built-in scanner interface and the option of editing four fonts at once so that you can work on italic and bold weights at the same time that you edit the normal style.

The success of *FontGen V* will depend on whether VS Software improves the arcane interface of *FontGen IV+*. For example, you can't at present simply move the mouse from the editing window to the complicated multitiered menu. You have to press the tab key or both mouse buttons simultaneously; if you press one of the buttons an instant too late, you'll leave an unwanted pixel in the window.

EXTENSIVE EDITING OPTIONS

The whole screen is overly complicated, with menus on the right, dialog boxes at the top, and the editing window in the space that remains. But once you get used to all the keystrokes, the program offers an extensive range of editing functions, including scaling, sloping, rotation by 90-degree intervals, white-on-black inversion, plus quick creation of circles, ellipses, parallelograms, and triangles.

For the most precise control, *FontGen IV+* supports input from a tablet as well as a mouse. But you can also use it simply by moving the cursor keys and using shortcut keys to jump across the screen.



FACT FILE



FontCenter ProFont System
FontCenter
P.O. Box 6007
Lynnwood, WA 98036
(206) 771-8366

List Price: *ProFont* editor, \$300; *ProFont* conversion programs (printer-specific), \$100 each.

Requires: 192K RAM, one floppy disk drive; HP LaserJet or compatible printer (many other printers supported, call for details); Hercules, CGA, EGA, or VGA graphics adapter; DOS 2.0 or later.

In Short: Has the fewest tools of any font editor, but its skilled hands this package can get the job done. Not copy protected.

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FontGen IV+
VS Software Inc.
P.O. Box 164038
Little Rock, AR 72216-4038
(501) 376-2083

List Price: \$250
Requires: 256K RAM, two disk drives (hard disk recommended); HP LaserJet Plus, Series II, or compatible printer; DOS 2.0 or later.

In Short: A font editor with a fairly extensive set of tools but an awkward interface. Not copy protected.

CIRCLE 408 ON READER SERVICE CARD

When you order *FontGen IV+*, specify the kind of laser or dot matrix printer you use. You will receive a version that directly imports fonts in your printer's format.

Publisher's Type Foundry

Z-Soft Corp.'s \$545 *Publisher's Type Foundry*, Version 1.1, is the only program available on a PC that edits both bitmap fonts and typeface outlines. It's also one of the most technically breathtaking and spectacular-looking programs you can buy for a PC.

Publisher's Type Foundry runs under *Microsoft Windows*; hence you can transfer images to and from other programs in seconds. You can keep the bitmap editor



Publisher's *Type Foundry*'s bitmap editor and outline editor work in similar ways, but the outline editor includes an elaborate "gadget box" (shown over the dollar sign) that lets you scale or reshape a character.

and outline editor on-screen at the same time and open other windows that display details of the font you're editing or display a small-sized preview of the character as it will print.

The pride of the package is its outline editor. This works most smoothly with typeface outlines used in Z-Soft's *Publisher's Paintbrush*, but it can also be used to create PostScript-compatible typeface outlines.

The tools and gadgets in the outline editor let you modify an outline by pushing, bending, prodding, twisting, or flipping it and generally treating it like a piece of Silly Putty. Although you can create a typeface from scratch, Z-Soft recommends that you scan in a large font first, copy the scanned image to the bitmap editor for some preliminary cleanup, then transfer the improved version to the outline editor.

EDIT WITH CARE Outlines for PostScript require enormous care. If you start with the sample outlines on-disk, you'll have to spend many hours replacing each series of line segments with a continuous curve; otherwise the resulting outline will work only with printers equipped with 4MB of RAM.

The bitmap editor is more straightforward. It isn't designed for font creation, so it lacks some basic tools for making curves. But it lets you clean up a font quickly and easily and is a useful staging ground for fonts intended for the outline editor.

Utilities included on the disk translate LaserJet fonts and others into *Publisher's Type Foundry*'s editing format. Other utilities create *Microsoft Windows* and *Ventura Publisher* screen fonts.



FACT FILE



Publisher's Type Foundry, Version 1.1
Z-Soft Corp.
450 Franklin Road,
#100
Marietta, GA 30067
(404) 428-0008
List Price: \$545

Requires: 640K RAM, hard disk, *Microsoft Windows*, mouse, DOS 2.0 or later. EMS recommended.

In Short: A typeface outline editor combined with a bitmap editor. Technically spectacular. Not copy protected.

CIRCLE 409 ON READER SERVICE CARD



Softcraft Font Editor
Softcraft Inc.
16 N. Carroll Street,
#500
Madison, WI 53703
(608) 351-0500
(608) 257-3300 (in Wis.)
List Price: \$250

Requires: 512K RAM, hard disk, HP LaserJet or compatible printer, DOS 2.0 or later.

In Short: Contains every tool imaginable for fast, exact editing of LaserJet fonts. Not copy protected.

CIRCLE 409 ON READER SERVICE CARD

**You Want A Laser Printer
With Faster Processing Speed,
Sharper 400 dpi Resolution
And More Powerful Functionality.
But You Think
You Can't Afford It.**

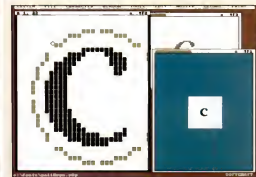
■ FONT EDITORS

SoftCraft Font Editor

Like most of the other SoftCraft programs designed to work with LaserJet fonts, the *SoftCraft Font Editor* is the best in its class. No other bitmap editor is as easy and efficient to use or has so many intelligent and well-chosen features.

You can buy the program separately for \$290, but it makes more sense to get it as part of the vendor's \$495 *SoftCraft Font Solution Pack* (also reviewed in this issue), which can immediately install any font you modify or create with the editor. The package also contains extremely useful font generating and managing programs.

The *SoftCraft Font Editor* doesn't make you convert fonts in and out of a special editing format. Using a mouse, you simply click on the filename of any LaserJet font, and in a second or two the letter A appears on your screen in two sizes in two windows. You can work on the fine details of the character in the large window while



The SoftCraft Font Editor allows multiple views of single or multiple characters. In the large window, the circle tool is converting the letter "c" into a copyright symbol.

checking the effect of your changes in the small one, and you can open up to five windows to compare different characters.

All the standard font-editing functions—and some unexpected conven-

iences as well—are available at the click of a mouse, although you can use keyboard shortcuts and cursor keys instead. Spline, ellipse, and circle tools let you create exact curves. An "edge" tool lets you add a line to a character while simultaneously cutting away an area adjacent to the line. A clipboard feature allows you to move part of a character from one window

PC EDITOR'S CHOICE

- Adobe Type Library
- Fontware
- IQ Engineering Super Cartridge 2
- SoftCraft Font Solution Pack

IQ Engineering's Super Cartridge 2 contains all the LaserJet fonts most people will ever need for correspondence, presentations, spreadsheets, and even elaborate desktop publishing. Fonts and workmanship are equally excellent.

For generating, managing, installing, and modifying LaserJet soft fonts, nothing matches the *SoftCraft Font Solution Pack*. If you simply want to install your fonts and forget about them, the programs in this package will do the job in seconds. If you want to customize every detail of your fonts, the job will take a bit longer, but this package can take care of every detail.

The best source of LaserJet fonts is Bitstream's library of Fontware

typeface outlines, which work with the Fontware font generators supplied with many major applications. Bitstream's fonts are vigorous, coherent designs in an enormous range of styles.

If Version 2 of SWFTE's Glyphix matches the promise of the beta release, this real-time font generator for the LaserJet will also deserve an Editor's Choice designation, but it's still too early to judge.

For PostScript printers, the splendid typefaces in the Adobe Type Library are the only choice. The typographic refinements made possible by the extended character sets in some of Adobe's latest fonts make PostScript the clear leader in desktop typography.

■ *The SoftCraft Font Editor* is the best in its class. No other bitmap editor is as easy and efficient to use or has so many intelligent, well-chosen features.

to another.

The *SoftCraft Font Editor* can handle .PCX and TIFF images that are no more than about 2 inches square. You can take a scanned image, import it into the *Font Editor*, and save it as a soft font to be used directly from your word processor.

Edward Mendelson is a contributing editor of PC Magazine.

With us, VGA stands for Very Good Alternative.



You don't have to pay top dollar to get VGA color technology in a monitor.

Not when there's an alternative with the world class quality of Samtron.

Our monitors are made in Korea, by Samsung Electron

Devices. One of the largest monitor manufacturers in the world. But, while we make monitors in volume, we don't make them in every possible model.

Just the most popular ones, refined for the international market. Like the 14" Samtron VGA color monitor you see on the right.

That keeps the production runs high, the costs low.

It's how we've been the money-saving alternative for smart monitor buyers in the U.S. and around the world since 1978. (Our service is also worldwide.)

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Mace Gold	70
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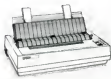
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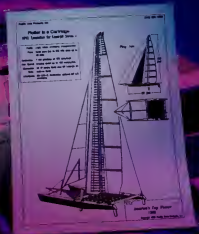
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CIRCLE 126 ON READER SERVICE CARD

■ PC LAB NOTES: DATABASE MANAGEMENT ■ RICHARD HALE SHAW AND TONY LIMA

MOVING UP TO DBASE IV

With its wealth of new features, dBASE IV can present a formidable challenge to dBASE III Plus users. The overview presented here, however, will smoothly pave the upgrade road.

Ashton-Tate Corp.'s long-awaited *dBASE IV* has finally arrived. With it comes not only a new look, but a host of new facilities, including a new user interface, more than 300 new commands and functions, an SQL (Structured Query Language) interface, a template language, windowing, and menu-building. The template language is used for reports, labels, and screen forms. New also in the *dBASE IV* program are an application generator; the DOCUMENT.GEN program documenter; and FORMBROW.GEN, which allows you to browse a "child" table in the screen form that belongs to its parent.

The sheer abundance of these new features means that moving from the familiar *dBASE III* environment to the improved *dBASE IV* environment is as big a step as you had to take when you advanced from *dBASE II* to *dBASE III*. This PC Lab Notes will try to simplify your passage to *dBASE IV* and assist you in moving old applications over to the new environment. Specifically, we will discuss

- major enhancements in indexing
- managing multiple file relations
- various new end-user commands
- user-defined functions (UDFs)
- user interface issues
- windows
- pop-up/pull-down menus and lists
- strategies for converting *dBASE III Plus* programs to *dBASE IV*
- compiling code
- the BUILD and DBLINK utilities
- arrays
- automatic multiuser features.

In addition to all of this information, there's a sidebar, "Transaction Processing in *dBASE IV*."

As if this weren't a large enough selection of topics, we have nevertheless been forced to leave out several of the program's new features, most notably the template language and *dBASE-SQL*. Fortunately for users, however, these omissions should not seriously affect most relevant transition issues.

PRODUCTIVITY INDEX

PC LAB NOTES

Easing the move from the familiar *dBASE III* environment to *dBASE IV*.

UTILITIES

The first OS/2 utility to appear in this column, COLOR.EXE.

ENVIRONMENTS

INISHOW.EXE demonstrates that PM rules can sometimes be broken.

POWER PROGRAMMING

A full explanation for accessing memory in protected mode.

SPREADSHEET CLINIC

Changing the colors of structures in a 1-2-3 worksheet.

USER-TO-USER

Turning ATTRIB into a file finder; installing program disks properly.

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Easy and inexpensive modem sharing; prevent anomalies and save RAM.

THE NEW INDEXING SYSTEM The older *dBASE III Plus* program incorporates a simple indexing scheme that is used for ordering and reordering the records in a database file. An index is a file (usually referred to as an .NDX file) that contains an entry for each record in a given database. Each individual entry in the .NDX file is composed of an index key and the physical record number of the record associated with that entry. The entries are maintained in ascending alphabetical order. The index file enables *dBASE III Plus* to present you with a sorted view of records that are physically unsorted.

Maintaining index files eliminates the enormous overhead that would be required to maintain a physically sorted database. Index files can be created quickly and easily; sort orders and keys to sort on can be changed literally on the fly; and as long as an index is active, any records that are newly added to the database will automatically be made available as part of the sorted index.

Under *dBASE III Plus*, each index required its own file (and DOS file handle). A more serious disadvantage to *dBASE III Plus* was that a maximum of ten index files could be open at once. You were thus limited to using only ten index keys on a database at any one time. Enter *dBASE IV* and its new multiple index file—the .MDX file, for short.

The *dBASE IV* .MDX file lets you create and store up to 47 different index keys in a single file. You can mix and match UNIQUE indexes, compound index expressions, and conventional single-field

■ PC LAB NOTES

index keys in the same .MDX file. You are allowed to have only one .MDX file open at one time, but if 47 index keys aren't enough, you can still open as many as ten single-key index files. Thus, under *dBASE IV* you can have $47(.MDX) + 10(.NDX) = 57$ indexes.

In order to maintain compatibility with *dBASE III Plus*, *dBASE IV* cannot only read old .NDX files, but it can also create files with an .NDX extension. Unlike *dBASE III Plus*, however, whose index files could only be created in ascending alphabetical order, *dBASE IV* now allows you to build indexes in either ascending or descending order.

The first time an .MDX file is created for a database, if you don't supply a name for the index file, *dBASE* gives it the same name as the database but with an .MDX extension. For example, if your database is

named CUSTCODE.DBF, the index file will be named CUSTCODE.MDX. This .MDX file becomes a unique file called the production index file. *dBASE IV* will always recognize this as a special index file that is to be opened and updated automatically whenever the related database file is in use, ensuring that the index file is always kept up to date. The program does this by checking the .MDX flag byte in the database file header. If byte 28 is set to 01h, *dBASE IV* will look for the file with an .MDX extension; if the flag is set to 00h, it won't.

As indicated, in *dBASE III Plus* each index that you create results in an .NDX file. Under *dBASE IV* each index becomes part of the same .MDX file. In order to distinguish between indexes within the .MDX file, each of the indexes has an associated tag that provides access to it.

Consider the following example:

```
USE CUSTCODE
INDEX ON CUSTID TAG CUSTID
INDEX ON LASTNAME+FIRSTNAME TAG CUSTNAME
INDEX ON STATE+ZIP TAG LOCATION
```

In this example, the .MDX file is automatically created as CUSTCODE.MDX. Three indexes are created in CUSTCODE.MDX, and each is given its own tag. Using these tags, the user or application then simply tells *dBASE IV* which index from the .MDX file to use. The index in current use is always referred to as the primary key; all other indexes are called secondary keys. *dBASE IV* does not automatically select a primary key. That must be done by the user or by the application.


The .MDX files must be carefully managed, and many of the new *dBASE IV* commands are dedicated to this task. Clearly, however, the use of multiple index files allows you to streamline your code and makes *dBASE IV*'s indexing scheme much more efficient than that of *dBASE III Plus*.

MULTIPLE FILE RELATIONS Previous *dBASE* versions severely limited your ability to express and control relationships between more than one database file. In essence, you could not relate a file to more than one other file.

Both in *dBASE III Plus* (though only through its programming language) and in *dBASE IV*, you can create a one-to-many relationship between a parent file and a single child file. In such a situation the child file has one or more records for every record in the parent. For instance, suppose the customer database mentioned above was related to a database of orders placed by the customers. For each customer, there are one or more orders in the orders database. You can link the two databases on the customer ID field (cust_id), as shown in Figure 1.

Note the use of the Set Skip command. This command tells *dBASE IV* that more than one child record may be found in addition to the initial match between the two files. *dBASE IV* does not automatically update or access any additional child records. Without the Set Skip command, additional records would not be found or displayed.

Set Skip determines the order in which database files are accessed and updated.



Multiple File Relations

You can relate the customers and orders databases on the cust_id field with the following code:

```
Select 1
Use customers
Use orders Order order_id In 2
Set Relation To order_id Into orders
Set Skip To orders
Go Top
```

You can relate the customers database to several different databases (children) on the cust_id field with the following code:

```
Select 1
Use customers
Use orders Order order_id In 2
Use contacts Order cont_id In 3
Use calls Order call_id In 4
Set Relation To order_id Into orders,
cont_id Into contacts, call_id Into calls
Go Top
```

Figure 1: In the code samples above, the cust_id field is used to link two databases. The *dBASE IV* program uses the Set Skip command to ensure that all child records will be found and displayed. In the *dBASE III Plus* program, you could not relate the parent file to more than a single child file, as is done in the lower portion of the illustration above.

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■ PC LAB NOTES

When you issue this command, *dBASE IV* will ensure that the record pointer in the child file's work area is updated before the parent file's record pointer is changed. This lets you access more than one occurrence of the same key in the two files.

In *dBASE IV* you can also create multiple file relations between databases where more than one child database file is related to the parent. As illustrated in the lower portion of Figure 1, you can, for example, relate the customer database file to three other files: an orders database, a database of customer contacts (individuals to contact at each customer company), and a sales call log (a database that tracks each call made to each customer over time). Again, the linking field is the customer ID number (cust_id).

This is one situation in which using the production indexes of *dBASE IV* can really pay off. One weakness of the older version becomes obvious if you open two database files in different work areas, create an .NDX index for each one, and use the same name for both .NDX files. If the index name is the same for each, only one index is actually created. That means that any changes made to the index in one work area will overwrite those in the other work area. By using the index tags in a production index, however, this problem is avoided, since the production index for each database has a different name—the same name as the database. Thus, a production index system of *dBASE IV* lets you use the same index tag names in each work area.

NEW COMMANDS Whether you're an end user or an application developer, there are a number of new *dBASE IV* commands you'll quickly find interesting and useful.

Set Autosave ON/OFF. This command allows you to force *dBASE IV* to save each record to disk as soon as it is modified. Normally, *dBASE IV* buffers disk updates, holding a batch of changed records in memory until the buffer is full. The whole buffer full of records is then written to disk at once. This is generally the most efficient way to perform disk I/O.

Autosave lets you turn this buffering facility off, reducing the chance of data loss due to power outages or other potential problems. The downside to providing this

The complete syntax for the Scan command:

```
Scan [scope] [For condition] [While condition]
[commands]
[Loop]
[Exit]
EndScan
```

The following example shows how to utilize SCAN ... ENDSCAN.

```
mdate = Ctod("01/01/89")
mdate2 = Ctod("01/01/90")
Go Top
Locate For ( date >= mdate .and. date < mdate2)
Do While .not. Eof()
  If (date >= mdate .and. date < mdate2)
    Do printinv
  Endif
  Continue
EndDo
```

This example using Scan/EndScan produces the same result:

```
mdate = Ctod("01/01/89")
mdate2 = Ctod("01/01/90")
Scan For (date >= mdate .and. date < mdate2)
  Do printinv
EndScan
```

Figure 2: The upper part of this figure shows the syntax for the *dBASE IV* Scan statement. The lower two portions contrast a traditional Do While procedure with the new, faster Scan approach.

additional security is that you then can't back out of edits and changes where you normally could (such as in Edit or Browse). And, of course, the additional disk I/O on every record slows down updates considerably.

LookUp(). This function lets you find records in a database you've opened in another work area. LookUp will perform a sequential search unless you happen to have ordered the database with an index that uses the searched-for field as a key. To use LookUp you must specify a search criteria, a field to search, and a field whose value will be returned.

LookUp's advantage is that it can reduce the work of several commands to a single step. Suppose, for instance, that you wanted to query the orders database mentioned earlier. Ordinarily, you would have to switch to work area 2, find a record, save the contents of a field, and switch back to work area 1. In *dBASE IV* you can simply call LookUp instead.

Unlike Seek and Find, LookUp can use an alias and search any database in any work area. With Seek and Find you have to take an extra step to retrieve the contents of

a field from the record that's found. LookUp will perform the lookup and retrieve the field in one step.

Scan. The new Scan command in *dBASE IV* is a programming construct that combines elements of Do While, Locate, Find, and Seek. It limits the number of records that you might otherwise have to process and simplifies complex programming loops.

Scan's scope expression and For condition provide bounds for the number of records being processed. If you do not specify a scope, it will default to all of the records in the file. The While condition allows termination of a scan when a given condition is no longer true.

Both the Loop and Exit keywords perform as they would in a Do While statement. A Loop command jumps back to the top of the Scan statement, while an Exit command breaks out of the Scan altogether. The EndScan marks the end of the statement, just as an EndDo does for a Do While statement.

Scan can take a scope just like Locate. For example, SCAN NEXT 5 will process the current and next four records. SCAN

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■ PC LAB NOTES

REST will process the rest of the records, starting with the current pointer position. You can use the For and While conditions to limit this. Figure 2 shows a Do While statement and a comparable Scan that produce identical results. In most cases using Scan will result in better, faster execution.

Calculate. Calculate, like Scan, allows you to combine several commands into a single step. It can perform several mathematical functions on an entire set of database records. Further, it can accomplish this with only a single pass through the database. Calculate eliminates the need for writing several coding loops that would make multiple passes through the database.

Calculate can execute any combination of the following functions against a database: Npv(), Std(), Var(), Min(), Max(), Avg(), Sum(), and Cnt(). You can use For and While to limit the records processed by Calculate. If these are not present, Calculate will process the entire database.

USER-DEFINED FUNCTIONS User-defined functions (UDFs) are a welcome addition to *dBASE IV*. They allow you to create your own functions and add them to the *dBASE IV* language during the course of your application. You identify and use UDFs in the same way as other *dBASE IV* functions: with a function name followed by parentheses. The parentheses contain a list of parameters passed to the function. Each UDF must have an explicit function definition. The syntax for creating UDFs is shown in Figure 3.

Each function definition consists of the Function keyword followed by the function name, the Parameter keyword followed by a parameter list, and the code that constitutes the body of the function. Note that, like the Procedure keyword, the Function keyword identifies the ensuing code as a function. UDFs must return a value appropriate to the call, and they must

```
Function <function name>
Parameter [parm1][,parm2...]
    * place function code here
Return [<expr>][To Master]
```

Figure 3: The syntax for *dBASE IV*'s user-defined functions is shown above. An example of a user-defined function is shown in Figure 4.

end with a Return statement.

Macro substitution is not allowed inside a function, and there are many commands that cannot be used in user-defined functions. Note that you should not write functions with the same name as any of *dBASE IV*'s built-in functions, nor can you substitute one of your own functions for one that's built in: *dBASE IV* will always ig-

nore your function in favor of one of its own.

Like procedures, however, UDFs allow you to create highly structured programs in which you can encapsulate and hide the details of a specialized task. You can make your program smaller and more efficient by using the same function over and over again for a particular task. This

TRANSACTION PROCESSING IN *DBASE IV*

Transaction processing is a technique that gives applications a greater ability to ensure database integrity. This can be a crucial consideration in a networking or multiuser environment, where several users or processes can make modifications to a database at any one time. In a single-user environment, you can implement transaction processing to provide insurance against power outages, locked files or records, or other acts of God that would otherwise corrupt a database. When you use transaction processing, you can always restore or recover database files if they become corrupted.

TRANSACTIONS In simple terms, a *dBASE IV* transaction is a unit of work—a sequence of one or more database operations—that modifies one or more database files. Typically, the application programmer decides how many database commands are processed per transaction. Thus, it's up to you to define the extent of a transaction. Transaction processing ensures that database files are always in a consistent state, both before and after a transaction takes place.

The key concept here is that during the course of a given transaction, database files are considered to be in an inconsistent state. If a transaction is interrupted, transaction processing makes sure that the database can be rolled back to a previously known consistent state. (This recovery process is called a *rollback*.) When you roll back a transaction, all updates to the database (additions, deletions and changes) will be reversed.

The database files are then left in their original, consistent state, as if the transaction had never taken place.

A TRANSACTION PERIOD Several *dBASE IV* commands give you significant control over transaction processing, both from within an application and from the dot prompt. Begin Transaction notifies *dBASE IV* that a transaction has begun. The transaction continues until an End Transaction command is encountered. Obviously, a transaction should not last for any extended period of time, so the number of commands issued during the transaction period should be kept to a minimum. *dBASE IV* keeps all file and record locks created during the transaction in effect until a transaction ends. Thus it becomes all the more crucial to keep a transaction period to a minimum duration.

dBASE IV creates a transaction log file during each transaction and logs all changes made to a database file during that period. It continues to do so until the End Transaction command is encountered. End Transaction tells *dBASE IV* that the transaction has been successfully completed. When *dBASE IV* encounters the End Transaction command, it purges the transaction log file, and releases any file locks against the database files involved in the transaction. Note that transactions cannot be nested; you must issue an End Transaction command before issuing another Begin Transaction.

If an error occurs during a transaction *dBASE IV* uses the transaction log file to

simplifies program maintenance by isolating the code that does the work for any given task. While the *dBASE* language does not have all the attributes that are found in the more popular high-level languages, the addition of user-defined functions to *dBASE IV* is a step in the right direction. Figure 4 provides a commented example of a UDF.

IMPROVED USER INTERFACE In comparison with its predecessor, *dBASE IV* offers substantially better screen control by providing commands for creating and manipulating windows and three types of menus. Indeed, there are so many windowing commands that learning them may initially appear a formidable task. Fortunately, they become a little easier to deal

with as you become familiar with the *dBASE IV* windowing terminology, which includes

- Window—a specific screen area in which ensuing operations will take place.
- Horizontal menu—a list of selectable items that appear horizontally across the screen.
- Pop-up menu—a list of selectable

restore the database to the state it was in before the transaction began. The *dBASE IV* Rollback command rolls a database back to its state prior to the issuing of a Begin Transaction command. Rollback uses the log file to restore the database by reversing the transactions.

On a single user system, the transaction log file is called *TRANSLLOG*. On a network workstation, it's called *workstation.LOG*, where *workstation* is the network name of the workstation that issues the Begin Transaction command on the network. Note that on a Novell network, the workstation name is its log-in ID.

dBASE IV allows you to find out which users have locked a record or database file in the event this causes an error. You can use the *Lkxsys()* function to retrieve the name of the user who locks a file or record, and the date and time the file or record was locked.

Before you can use *Lkxsys()*, however, an additional field must be added to the database structure of all databases that might be locked. The *Lkxsys()* function retrieves the locking information from this field. You add this field, called *_dbaselock*, with the *dBASE IV* Convert command. The field may vary from 8 to 24 characters in size. How large you make *_dbaselock* depends on how much locking information you would like to be able to retrieve: the more information you need, the bigger the field must be. It also depends on how much space (calculated by the size of the field times the number of records in the database) you're

willing to add to the database.

To use transaction processing on a network, each user must log in with a different user name. This is generally a good practice in any case, but it is doubly important here, because *dBASE IV* cannot distinguish between file locks by users with the same name. The return values from *Lkxsys()* will be identical in such a case.

dBASE IV provides several commands and functions that facilitate error processing in conjunction with transaction processing. The *On Error* command lets you specify a program that will be run in the event that a *dBASE IV* error (such as a locked file) occurs. This facility gives you control error processing so you can, for example, notify the user and give him options. You can use the *Retry* command to return from the error processing program and retry the error that occurred.

The *Rollback()* function tests the success of a Rollback command. The *Ismarked()* function detects the presence of a transaction in progress. And, the *Completed()* function tests to see if a transaction was completed successfully. This last is a kind of poor man's *On Error*: it tells you *whether* the transaction was successful, but doesn't do anything about it.

HOW DOES IT MEASURE UP?

While transaction processing capability represents a step forward for *dBASE IV*, its implementation is certainly not state-of-the-art. In many relational database environments, changes to a database are

recorded automatically, but the changes are usually made to a "shadow" database—one that makes it appear as if the real database has been changed, when it actually hasn't.

In these other environments, once you're satisfied with the changes made to a database, you issue a *Commit* command, which forces the changes onto the database. If you are not satisfied, you can back out of the changes by issuing a *Rollback* command, which undoes any changes back to the previous *Rollback* or *Commit*. Thus, an application can use transaction processing to reverse changes routinely made by users—not just for error recovery.

With *dBASE IV* the opposite occurs: changes are immediately made to the real database itself, and you must go through a "physical" rollback sequence to reverse them. Essentially, the difference is that traditional transaction processing implementations are application driven—the application (or in some cases the user) makes the decision about when a transaction will be committed to the database. In *dBASE IV* the implementation is fundamentally error driven. The transactions are always committed to the database, but you can undo them if an error occurs.

Nevertheless, even a somewhat limited transaction processing capability is better than none at all, and it's certainly good news for *dBASE* developers that they now have much better error and data corruption control over applications.

—Richard Hale Shaw

■ PC LAB NOTES

```
* functest.prg RRS 2/20/89
*
* This program demonstrates the use of a dBASE IV User-Defined Function
* you can use to create windowed error messages.
*
* The function, wmsg() requires two parameters.
* The first parameter is the message you wish to print.
* The second parameter is used to prompt the user to press any key or a
* particular key. The function will return the keystroke pressed.
*
* For instance,
* choice = wmsg("Ready to re-index database.", "Proceed? (Y/N)")
* if upper(choice) = 'Y'
*   ** reindex database
*   endif
*
* The only requirement for using the function, is that you must define the
* wmsg win window somewhere in your program code.

Define Window wmsg_win from 12,5 to 15,75 double color gr+tr

retval = wmsg("This error message appears in a window...", "...Press any key")
?return value was ",retval
return

Function wmsg
Parameters msg,prompt
Activate Window wmsg_win      ** activate the window
@ 0,0 say msg                  ** print main message
Wait prompt To retval          ** print prompt, wait for key
Deactivate Window wmsg_win     ** deactivate window
Return retval                  ** return key
```

Figure 4: The user-defined function `wmsg()` shown above creates a message window, displays a message and a prompt, waits for the user's keystroke, and returns the value of the key pressed.

items that appear vertically on the screen within a framed border.

■ Pull-down menu—a pop-up menu attached to an item in a horizontal menu. When the menu item is highlighted, the associated pull-down menu appears.

■ Pads—the prompts or selections in a horizontal menu.

■ Bars—the prompts or selections in a pop-up or pull-down menu.

Your application can utilize *dBASE IV*'s windowing capabilities in several ways. You can create a window that acts as a "view" into a series of database records. You can also display the memo fields from a database record in a window. Or you can use a window to display error messages or user prompts.

There is a strict set of steps to follow when creating and manipulating these screen objects. Before you can do anything with a window or menu, you must define it. Next, you must activate the window or menu when you want it to appear on the screen. Finally, you must deactivate it when you're through with it.

When you issue the Define Window command, you supply a name for the window and specify the upper-left and lower-

right window coordinates. These coordinates must fit within the boundaries of the screen. Optionally, you can specify the screen border characters and colors in the window definition. Window borders may consist of single or double lines, a reverse-video character, or a character string. You can define up to 20 windows at a time.

Once defined, a window is activated (appears on the screen) through the Activate Window command. When you make a window active, *dBASE IV* maps all screen input and output to the area within the window's borders. The upper-left cursor position of a window becomes the reference position 0,0 that governs all subsequent screen commands. Only dot prompt commands are exceptions to this rule.

When a window is activated it appears on-screen and covers whatever is currently within its screen coordinates. Anything in the covered area is automatically saved, however. The Activate Window command can take as parameters either a list of window names or the All keyword. If you give it a list of window names, the last window named becomes the active window. Windows can be moved about the screen with the Move Window command.

Logically enough, the DeActivate Window command deactivates a window. When deactivated, the window simply disappears. *dBASE IV* then restores to the screen whatever was originally beneath the deactivated window. If there are only two windows on the screen and you deactivate the active window, *dBASE IV* automatically activates the remaining window. If you deactivate the active window and more than one window remains, the most recently activated window becomes the new active window.

You can use the Activate Screen command to write to the screen outside the active window while still leaving the window on-screen. This resets the screen coordinates so that output once again goes to the full screen. In this case, however, if any of the screen output falls within the boundaries of the displayed windows, that output will be lost when you activate or deactivate the windows. While the full screen is active, some commands (like List) can scroll a window off the screen altogether. You can reactivate any of the windows again with Activate Window.

dBASE IV does not remove a window from memory when you deactivate it. That requires a separate command. You can remove all windows from the screen and from memory with the Clear Windows command. Or, you can remove specific windows from the screen and memory with Release Windows.

You can save windows to a disk file for later use with Save Window, or restore them from the disk file with Restore Window. *dBASE IV* stores windows in files designated with a .WIN extension. The ability to save windows is a very useful feature, since it lets you use the same windows in different applications.

HORIZONTAL MENU *dBASE IV* lets you define horizontal menus with the Define Menu command. An optional Message parameter lets you display a message centered on the bottom line of the screen while the horizontal menu is active. The selections in a horizontal menu are called pads. You must use the Define Pad command to define each individual pad before you can use it in a horizontal menu.

The Activate Menu command displays the named menu, with the prompt pads ac-

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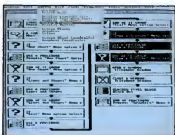
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cessed in the order in which they were defined. By default, Activate Menu highlights the first pad defined, but any pad can be designated for initial highlighting. The Left and Right Arrow keys move the highlight between the menu pads.

The On Selection Pad command lets you associate a menu pad with a *dBASE IV* command, procedure, or program. So, if the user presses the Enter key to select that pad, the specified command or program is executed.

You can remove a menu from the screen with DeActivate Menu. This simultaneously restores whatever screen information had been covered by the menu. Like their window counterparts, you can use Release Menus to erase menus and remove them from memory and Clear Menus to erase and remove menus that are not in use.

POP-UPS, PULL-DOWNS, LISTS

A *dBASE IV* pop-up menu presents a list of selectable items in a framed border. Items can be selected either by typing the first letter of the item or by moving the highlight to the item and pressing Enter. Since pop-ups are vertically oriented, you use the Up and Down Arrow keys to move between items.

As with windows and horizontal menus, you must define a pop-up menu before you can use it. To do this you use the Define PopUp command and provide the screen coordinates for the menu. Each selectable item in a pop-up menu is called a *bar*, which is defined using the Define Bar command. Each line in a pop-up menu is referred to by number, starting with 1 on the top line.

The Skip clause in the Define Bar command lets you make a given bar nonselectable. This permits you to create bar selections that will be available and selectable only under specific conditions. For example, the clause

`Skip for RecCount() = 0`

will cause a bar to be skipped if there are no records in the database file. You can create blank lines between menu items simply by omitting the bar definition for the line that you want to be blank. For example, if you define lines 4 and 6 in a pop-up menu, line 5 will be blank and the high-



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light will automatically skip over it.

Again, you activate a pop-up menu with the Activate PopUp command. When a pop-up menu is activated, *dBASE IV* leaves any previously activated pop-ups on the screen and places the new pop-up on top of them. A menu bar in a pop-up menu can activate another pop-up menu, or execute a *dBASE IV* program or command. You control the action that takes place when the user selects a menu bar with the On Selection PopUp command.

When you're through with the pop-up menu, you deactivate it with DeActivate PopUp. You must use some care in doing this, however, for when you deactivate a pop-up menu, *dBASE IV* terminates it

along with any menus and procedures that it called via On Selection PopUp. If there is any code remaining in a called procedure, then that code will not be executed.

A pull-down menu is simply a pop-up menu that appears when you move the highlight to a particular pad of a horizontal menu. Thus, it "pulls down" from the menu pad. A pull-down menu differs from a pop-up menu in one respect: the user does not have to press Enter in order to activate it. He simply moves the highlight to the pad with which it is associated. In a horizontal menu without pull-downs, the user must select an item to display a sub-menu. Note that a pull-down menu's prompt for each bar takes priority over any

prompt from the light bar menu.

The On Pad command lets you designate a sequence of events that will occur when the user moves the highlight to the specified pad. These events may range from running a *dBASE IV* program or command to activating a pop-up menu. You can use the Activate PopUp clause in the On Pad command to connect pop-up menus with a pad and create pull-down menus. Figures 5 and 6 illustrate techniques using windows and menus.

dBASE IV provides a number of useful support functions for working with menus. Menu() returns the name of the currently active menu. The Pad() function returns the title assigned to the currently selected

* Winktest.prg R02 2/19/89

```
* This program demonstrates the new windowing and sequencing abilities of
* dBASE IV. At a first test, the program creates a window, and prints a
* message. Then, it waits until the user presses a key. Upon receiving the
* keystroke, the program moves the window from the upper left corner, to the
* upper right corner, to the lower right corner, to the lower left corner,
* and finally, back to the upper right corner.
*
* After removing the window, a horizontal menu, its pads, a pop-up menu for
* each pad, and their bars are defined, since each pop-up menu is
* associated with a pad, each becomes a pull-down menu.
*
* You'll notice that the arrangement and titles of the menu pads and
* pull-downs are a deliberate copy of the windows-type user interface.
*
* It should be easy to copy the ideas presented in this example program for
* use in an application.
```

Set Talk off

* Create, define a window...

```
Define Window wtest from 1,5 to 7,25 double
```

* Then activate it

```
Activate Window wtest
```

* Print a message in it

```
0 0,0 say "An example of dBASE IV windowing..."
```

Wait

* Now move the window around the screen, first right...

```
counter = 1
```

```
Do While counter < 58
```

```
Move Window wtest by 1,1
```

```
counter = counter+1
```

```
EndDo
```

* Then down...

```
counter2 = 1
```

```
Do While counter2 < 15
```

```
Move Window wtest by 1,1
```

```
counter2 = counter2+1
```

```
EndDo
```

* Then left...

```
Do While counter > 8
```

```
Move Window wtest by -1,1
```

```
counter = counter - 1
```

```
EndDo
```

* And back up...

```
Do While counter > 8
```

```
Move Window wtest by -1,1
```

```
counter2 = counter2-1
```

```
EndDo
```

* Now deactivate it and remove it from memory

```
DeActivate Window wtest
```

```
Clear Windows
```

* Now define a horizontal menu

```
Define Menu Main
```

* And define the individual pads (separators) in it...

```
Define Pad File of Main Prompt "File" At 8,4
```

```
Define Pad Edit of Main Prompt "Edit" At 8,18
```

```
Define Pad View of Main Prompt "View" At 8,38
```

```
Define Pad Search of Main Prompt "Search" At 8,58
```

* Now associate popup menus with each pad to make pull-down menus

```
Do Pad File of Main Activate Popup File pop
```

```
Do Pad Edit of Main Activate Popup Edit pop
```

```
Do Pad View of Main Activate Popup View pop
```

```
Do Pad Search of Main Activate Popup Search pop
```

* Now define each popup menu...

* Define the first popup

```
Define Popup File pop from 1,14 Message "File Operations"
```

```
Define its menu bars
```

```
Define Bar 1 of File pop Prompt "New"
```

```
Define Bar 2 of File pop Prompt "Open..."
```

```
Define Bar 3 of File pop Prompt "Open Last File"
```

```
Define Bar 4 of File pop Prompt "Save"
```

```
Define Bar 5 of File pop Prompt "Save As..."
```

```
Define Bar 6 of File pop Prompt "Print Program List..."
```

```
Define Bar 7 of File pop Prompt "Clear Program List..."
```

```
Define Bar 8 of File pop Prompt "Edit Program List..."
```

```
Define Bar 9 of File pop Prompt "Print..."
```

```
Define Bar 10 of File pop Prompt "Print..."
```

```
Define Bar 11 of File pop Prompt "Print..."
```

```
Define Bar 12 of File pop Prompt "Print..."
```

```
Define Bar 13 of File pop Prompt "Print..."
```

```
Define Bar 14 of File pop Prompt "Print..."
```

```
Define Bar 15 of File pop Prompt "Print..."
```

```
Define Bar 16 of File pop Prompt "Print..."
```

```
Define Bar 17 of File pop Prompt "Print..."
```

```
Define Bar 18 of File pop Prompt "Print..."
```

```
Define Bar 19 of File pop Prompt "Print..."
```

```
Define Bar 20 of File pop Prompt "Print..."
```

```
Define Bar 21 of File pop Prompt "Print..."
```

```
Define Bar 22 of File pop Prompt "Print..."
```

```
Define Bar 23 of File pop Prompt "Print..."
```

```
Define Bar 24 of File pop Prompt "Print..."
```

```
Define Bar 25 of File pop Prompt "Print..."
```

```
Define Bar 26 of File pop Prompt "Print..."
```

```
Define Bar 27 of File pop Prompt "Print..."
```

```
Define Bar 28 of File pop Prompt "Print..."
```

```
Define Bar 29 of File pop Prompt "Print..."
```

```
Define Bar 30 of File pop Prompt "Print..."
```

```
Define Bar 31 of File pop Prompt "Print..."
```

```
Define Bar 32 of File pop Prompt "Print..."
```

```
Define Bar 33 of File pop Prompt "Print..."
```

```
Define Bar 34 of File pop Prompt "Print..."
```

```
Define Bar 35 of File pop Prompt "Print..."
```

```
Define Bar 36 of File pop Prompt "Print..."
```

```
Define Bar 37 of File pop Prompt "Print..."
```

```
Define Bar 38 of File pop Prompt "Print..."
```

```
Define Bar 39 of File pop Prompt "Print..."
```

```
Define Bar 40 of File pop Prompt "Print..."
```

```
Define Bar 41 of File pop Prompt "Print..."
```

```
Define Bar 42 of File pop Prompt "Print..."
```

```
Define Bar 43 of File pop Prompt "Print..."
```

```
Define Bar 44 of File pop Prompt "Print..."
```

```
Define Bar 45 of File pop Prompt "Print..."
```

```
Define Bar 46 of File pop Prompt "Print..."
```

```
Define Bar 47 of File pop Prompt "Print..."
```

```
Define Bar 48 of File pop Prompt "Print..."
```

```
Define Bar 49 of File pop Prompt "Print..."
```

```
Define Bar 50 of File pop Prompt "Print..."
```

Figure 5: The program above demonstrates the use of windows and menus in *dBASE IV*. It first creates a window and displays it. Then, when the user presses a key, it shifts the window around the screen. Next, it creates a pull-down menu interface. Pressing Esc terminates the program.

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■ PC LAB NOTES

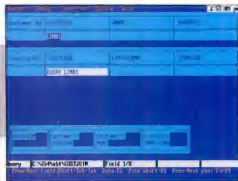


Figure 6: This User Interface was created from WINTST.PRG (Figure 5). The main horizontal menu includes four pads or selections. Each pad activates a pop-up menu. When you activate the pop-up menu associated with the "File" pad, the procedure defined at the end of WINTST.PRG takes control. The procedure can evaluate each bar you press. Thus, when you press "Open . . .", another pop-up menu is defined and activated, allowing you to select drives, directories, and files.

pad. Bar() returns the number of the currently selected pop-up bar. The Prompt() function is the only effective way to work with file, field, and value pick lists. It returns a character string that represents the value of the prompt selected, whether from a light bar or a pop-up. These functions can be used to let a program or subroutine "know" which menu, pad, or bar was selected, without requiring that you pass this information to the program itself.

Finally, dBASE IV also provides "lists," which are actually a special kind of pop-up menu. Lists come in three flavors, according to their contents: File lists, Field lists, and Record lists. File lists pop-up a list of files on the disk or in the current dBASE IV catalog. Field lists display a group of fields defined by the Set Fields command. Record lists display the contents of each record in a field.

CONVERSION STRATEGIES Having covered the most important new features in dBASE IV, it's time to turn our attention to the issue of moving applications from dBASE III to the new environment. It's important to note that dBASE IV program code is 100 percent upwardly compatible from dBASE III Plus. That can actually make the transition from dBASE III Plus to dBASE IV easy: just run the old code under dBASE IV.

This easy path, however, precludes taking advantage of the new features available under dBASE IV. A more sensible strategy, then, is to port application code over by modifying any code that will benefit from specific dBASE IV features. Such

modifications will result in improved program execution speed, reduction in code volume, better distribution of completed programs to users, and easier program maintenance in the future. The trade-off, as usual, is the amount of time you must devote to converting code to new procedures and programs.

THE COMPILER The new compiler, which is a tokenizer that reduces both the execution time and (usually) the program size, is the major factor in producing the speed improvement found in dBASE IV. Since the new version automatically compiles all programs before running them, virtually every one of your old dBASE III Plus programs will run noticeably faster under dBASE IV. Ashton-Tate claims performance improvements of nine to ten times; our own tests indicate that an improvement by a factor of at least seven can be anticipated. Because of its full compatibility with dBASE III Plus, the dBASE IV compiler's actions on an application are virtually transparent.

Unless you're using the debugger, dBASE IV will not run uncompiled code directly. All you have to do to compile a previously uncompiled program, however, is run it from the dot prompt using the

Do program filename

statement. If you wish, you can compile an old program directly from the DOS command line when starting up dBASE IV by entering

dbase program filename

dBASE IV will compile your .PRG file into a file with the same name and give it a .DBO (DataBase Object file) extension. Alternatively, you can enter

COMPILE program filename

from the dot prompt. Note also that if dBASE IV encounters a

DO program filename

command in the currently executing program, it will compile the new program module on the fly.

Suppose you compile a program file but then make some changes. Suppose that you forget to recompile the module and simply enter

DO program filename

To avoid a problem, you can set up dBASE IV to compare the DOS date and time stamps on the .PRG and .DBO files and automatically recompile the .PRG file if the date and time are different. To do this you SET DEVELOPMENT = ON from the dot prompt or, better still, you can put the command DEVELOPMENT = ON in the CONFIG.DB file. We strongly recommend leaving Development set On always, even though it does slow execution somewhat, since the date and time must be compared before execution of the .DBO file can begin.

THE BUILD UTILITY AND DBLINK

One easy way to make compiled code more efficient is to link program modules into a single tokenized file by using the BUILD utility. BUILD is available with the Developer's Edition of dBASE IV. Other programming tools include DBLINK, template language source code files and the template language compiler and interpreter, several LAN key disks, and an unlimited Runtime with no license fees. Most of the conversion strategies discussed in this column don't require the more expensive Developer's Edition of dBASE IV.

DBLINK and BUILD provide two of



Figure 7: *BUILD* is a menu-driven utility that helps you to compile and link program files. It is supplied with the Developer's Edition of *dBASE IV*.

the traditional functions of linkers: combining individual .DBO files and selective recompilation. The syntax for *DBLINK* is quite simple:

DBLINK main program filename [/L]

DBLINK processes the entire program tree, including any procedures and program files invoked in the main program or subprograms. Note that only compiled files can be processed with *DBLINK*. The /L option redirects the linker output from the screen to a disk file. The file will have the same name as the main program file, but will have a .TXT extension.

When a single .DBO file has more than one module linked into it, it is not necessary to recompile all the modules when individual modules are modified. Only the modules that have been changed need to be recompiled. You then simply relink the individual .DBO files.

BUILD is a menu-driven program that will automatically analyze, compile, and link a set of program files. *BUILD* can be set up to include or exclude different file types. The utility has two main pop-up menus. As shown in Figure 7, the first menu lets you specify the name of the main program with the Compile option. If linking isn't desired, it can be turned off by changing the Link yes/no option to no. You can send the finished .DBO file and all associated files to a different drive and directory (or to a floppy disk) by invoking the Output destination option. You should invoke the final option, Perform build, only after you have set all the other parameters, including those from the Options menu.

The second menu is the Options menu (see Figure 8). Generally, you'll accept all of the default Option values. For example, the Search for new functions yes/no option

checks for user defined functions that have the same name as built-in *dBASE IV* functions. When yes is specified for this option, *BUILD* will include an error message for every redundant UDF name in a given program. (Remember, *dBASE IV* will execute its own internal function if a UDF has the same name as one of *dBASE IV*'s own functions.) You must then change the name of your function if you still want to use it. If you're sure you have no functions with the same names as those of *dBASE IV* functions, however, changing this to no will speed compilation. The other choices all serve useful purposes, but we'll leave them to you to explore.

The compiler and linker are probably the two most important tools available for speeding up program execution. Utilizing these tools obviously rates very high on the list of strategies to pursue, since programs have to be compiled anyway, and linking is very fast and easy. Up to this point, however, nothing we've discussed involves changing your existing code. Let's take a look now at how you can modify your programs to provide significantly better performance.

CODE CHANGES The earlier discussion of .MDX files should make it clear that converting old .NDX files into the new .MDX format will gain performance points. There's no real reason not to do so. Of course, code that specifically looks for certain .NDX files will need to be changed.

Remember, too, that the Scan . . . Endscan construct is significantly faster than a comparable Do While structure. Do While code, therefore, becomes an obvious candidate for modification. If you're facing the problem of converting from *dBASE III Plus* to *dBASE IV* and your program frequently moves the pointer with Do While and Skip, this code change will make a major difference.

We mentioned previously that Set Skip is designed to handle one-to-many relations. *dBASE III Plus* has a real problem handling one-to-many relations, and the code necessary to implement such relations runs slowly. Set Skip solves this problem, so any code that involves one-to-many relations is also a prime candidate for modification.

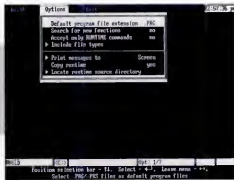


Figure 8: The Options menu is part of the *BUILD* utility. You can generally accept the default options provided.



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■ PC LAB NOTES

ARRAYS One very welcome addition to the *dBASE IV* environment that we haven't yet mentioned is its implementation of two-dimensional arrays. Array elements are referenced by row-column coordinates. For example, the following commands set up a 3 by 16 array called CUST, initialize element (2,14) as a numeric type with a value of 0, and initialize element (3,5) as a character type with a value of "PCMAG".

```
DECLARE CUST[3,16]
CUST[2,14] = 0
CUST[3,5] = "PCMAG"
```

As you see, data types can be mixed within an array. That means you can use the new Copy To Array and Append From Array commands to move records from one database to another. Suppose, for instance, that you want to move a record from CUSTOMER to the temporary database CUSTTMP for editing. Here's how to do it in *dBASE IV*:

```
DECLARE CUST[10] 44 CUSTOMER has 10 fields
SELECT 1
USE CUSTOMER
COPY TO ARRAY CUST1 FOR CUSTCODE = '10001'
SELECT 2
USE CUSTTMP
APPEND FROM ARRAY CUST1
```

If you were using the *dBASE III Plus* program, you would have to do something like the following:

```
SELECT 1
USE CUSTOMER
COPY TO TMP FOR CUSTCODE = '10001'
SELECT 2
USE CUSTTMP
APPEND FROM TMP
```

The problem here is that TMP is a disk file. The *dBASE III Plus* procedure requires one disk write and one disk read. Since arrays are in-memory objects, all the data transfer should instead be done through memory, with an obvious and possibly dramatic improvement in speed.

The *dBASE IV* Copy To Array command can include a fields list (FIELDS field list), so partial database copies are easily done. With the use of this command, fields are copied in the order listed, so you can reorder them in the sequence needed for the database used by Append From Array. If you want more than one record in an array, the first dimension of the array determines the number of records; the second, the number of fields.



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■ PC LAB NOTES

NEW CLAUSES FOR USE The Use command now supports several new clauses. These allow you to open a database in the unSELECTed work area, to open a database in more than one work area, and to open a read-only version of a database. To open a database in an unSELECTed work area, use the syntax

USE filename IN work area number

Note that this does not change your currently SELECTed work area.

One of the most unusual new clauses with Use is the keyword AGAIN. Note that it is not described in the dBASE IV documentation, so read on! This keyword allows you to open the same database in two different work areas. Effectively, you can maintain two different pointers and primary indexes for the same database or use two different primary indexes. This means you can do SEEKs and FINDs on two different keys without changing the primary key.

To understand how AGAIN works, consider the following dBASE III Plus commands:

```
SELECT 1
USE CUSTOMER
SELECT 2
USE CUSTOMER
```

You know, of course, that dBASE III Plus will dutifully report the error message "File is already open" after the last command. In dBASE IV, however, the commands below will work:

```
SELECT 1
USE CUSTOMER AGAIN ORDER CUSTCODE
USE CUSTOMER AGAIN IN 2 ORDER ZIP
```

You can now do a FIND or SEEK on the CUSTCODE field in work area 1 and the ZIP field in work area 2. Now, after the previous commands, try this:

```
FIND <custcode value>
DISPLAY CUSTCODE, ZIP
SELECT 2
FIND <zip code value>
DISPLAY CUSTCODE, ZIP
```

You'll see the different record numbers and values displayed in the two work areas. According to Ashton-Tate, problems can arise when using the keyword AGAIN in the Use command with the same index in two different work areas. Basically, the

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■ PC LAB NOTES

indexes can become corrupted if you are adding or editing data. Our advice, then, is simply not to USE the same database in two different work areas while you are adding or editing data.

Finally, USE filename NOUPDATE prevents any addition or editing of data in that database. Implementing these clauses in place of more elaborate *dBASE III Plus* code will shorten code considerably and speed program execution.

AUTOMATIC MULTIUSER FEATURES

dBASE IV includes a number of multiuser features that can (and should) replace existing *dBASE III Plus* code. *dBASE IV* will automatically lock a record or a database, as necessary. Automatic retry and timeout are now implemented. And real-time screen updates are available for networked editing.

You can therefore throw out many of the multiuser procedures you have written to implement automatic retries of locked files and multilevel locking. In general, commands that change a single record will lock that record. For example, `EDIT n` will attempt to lock record number *n*. Similarly, the commands

REPLACE field WITH expression

will lock the current record. On the other hand, commands that change more than one record will lock the entire database. Thus,

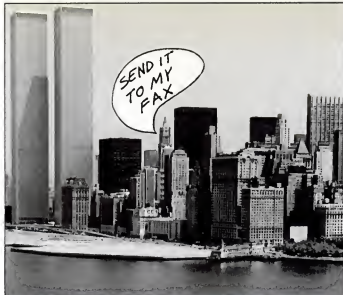
REPLACE ALL field WITH value

will lock the entire file.

These locking commands come at a price—somewhat larger databases. Before they can be used, the following commands must be issued for each database in a given application:

**USE database name
CONVERT**

CONVERT adds a single 16-byte field called `_DBASELOCK` to the database. This field stores locking information for each record or file, including the date and time the object was locked and the first eight characters of the network name of the user who locked it. (If you want more or less of the network name stored, give the command `CONVERT n` where *n* must lie between 8 and 16. The *n* is the number of



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■ PC LAB NOTES

```

* Program MAIN.PRG
:
:
* Function ALLTRIM() is user-defined
SCAN
  lc_pict = lc_pict + ALLTRIM(LASTNAME) + ', '
ENDSCAN
:
:
* EOF: MAIN.PRG
* Function ALLTRIM() is a user-defined function
* It removes leading and trailing blanks
FUNCTION ALLTRIM
PARAMETERS lc_string
PRIVATE lc_string
lc_string = LTRIM(RTRIM(lc_string))
RETURN(lc_string)
* EOF: FUNCTION ALLTRIM()

```

Figure 9: dBASE IV allows you to put user-defined functions into program files. The short dBASE IV program shown above trims leading and trailing blanks from character strings.

bytes allocated to _DBASELOCK. The space that is available for the network name is n-8.)

There are benefits to giving up the extra disk space this process consumes. Since record and file locking is now automatic, it is now much faster than procedures you may have written. And though we won't be getting into details here, you can access the information in the _DBASELOCK field for use in your programs.

One of the most interesting aspects of dBASE IV's multiuser operations is that real-time screen updates are provided. If one user is editing a record, any changes to the record will be reported, more or less in

real time, to any other users who are viewing that record. The actual length of time between screen updates is controlled by the SET REFRESH TO expN command, where expN is the number of seconds between screen updates. Try a value of 5 seconds and increase or decrease it depending on how network performance is affected—the more frequently the network updates screens, the less time it can spend on other activities.

Taking advantage of these new multiuser features will not only speed up program execution but will also give users more information about who has locked files and records.

PROCEDURALIZE CODE dBASE IV allows you to put procedures—and not just those designated as procedure files—at the end of any program file. This means that you can structure your programming, using procedure files only for those procedures that are called by a number of program modules. Procedures used by only one module should be included with that module.

You can have up to 1,170 procedures active at one time, so you probably won't run out soon. Procedures allow more-structured programming, making code easier to maintain. And a procedure can be a user-defined function. Figure 9 shows a function (and the function call) that trims leading and trailing blanks from a character string.

Procedures and user-defined functions make code much easier to maintain and understand. They can also improve execution speed if used correctly.

AND THERE'S MORE There is much we haven't been able to cover. For example, memo fields now have significantly more utility than they did in dBASE III. Make it a point to experiment with their use. Make sure also to explore the possibilities of QBE (query by example), which is the easiest way to establish relations between multiple data files. Figure 10 provides a useful example as a starting point. Finally, note that the CONFIG.DB file now supports the installation of up to four printers and up to five fonts for each printer driver.

dBASE IV is not perfect. But it is a major step up on the evolutionary ladder. Porting your older applications to the new environment will result in dramatic increases in performance. By utilizing the new windowing and menuing capabilities provided in dBASE IV, you can visually enliven your applications, as well. Take into account what's new, consider carefully the strategies suggested here, and the transition to the new environment will almost take care of itself.

Tony Lima is a well-known dBASE IV author, consultant, and seminar leader. He is the author of Inside dBASE IV (Addison-Wesley, 1989). Richard Hale Shaw is a contributing editor of PC Magazine.

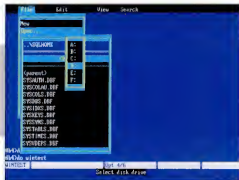


Figure 10: This screen shows dBASE IV's Query By Example (QBE) facility being used to link databases together.

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PUTTING COLOR IN THE OS/2 KERNEL



The first OS/2 utility in this column, COLOR.EXE, lets you dress up your screen while using the text-mode applications likely to be the earliest ported to the new operating system.

If OS/2 is the operating system of the future, it shouldn't look worse than the DOS it's designed to supplant. DOS utilities that let you set the screen colors of your choice have been with us for years, so it's downright discouraging to bring up OS/2 Version 1.0, or to switch to the Presentation Manager's full-screen command line window in Version 1.1, and find yourself stuck with the default white-on-black "color" scheme.

Actually, neither DOS nor OS/2 has a COLOR command as such, though OS/2 provides the hooks for one. In DOS, though some color-setting utilities are more successful than others, just about the only foolproof way to make your color choices stick through a lot of screen clearing and application changing is to load the ANSI.SYS extended keyboard and screen driver via your CONFIG.SYS file and set the screen attributes through the driver. But running DOS's ANSI.SYS has its own well-documented drawbacks. For one thing, the escape sequences you must issue are extraordinarily convoluted. For another, ANSI.SYS is hard-wired for 25 lines of text per screen—a bitter pill for EGA and VGA users who want to use 43- and 50-line displays.

Appropriately then, COLOR.EXE, the first OS/2 utility to appear in *PC Magazine's* Utilities column, lets you set the screen colors the way you want them. Thanks to the robust functionality of OS/2, your colors will stick—even when you clear the screen or return to the command line after running an application program—and text screens in excess of 25

lines will no longer present a problem. And even though its architects seem to want to look past the text-based OS/2 Version 1.0 to the "real" OS/2—the graphics-based Presentation Manager (Version 1.1)—many of the first applications that you will actually be able to use under OS/2 are likely to be "full-screen" kernel applications.

As explained in the "COLOR by Modem" sidebar, the easiest way to get a ready-to-run version of COLOR.EXE is to download it from PC MagNet. As an alternative, however, you can also create it by entering (or downloading) and running the

COLOR.BAS listing in BASIC. Of greater interest to programmers, the source code for COLOR.EXE is given here—and can be downloaded from PC MagNet—both in assembly language and in C. The sidebar "A Tale of Two Languages" provides instructions for using either of these files to create COLOR.EXE.

COLOR, PLEASE COLOR.EXE is a protected-mode utility designed to be run from the command line in OS/2 1.0 or 1.1. If you are using OS/2 1.1 and load Presentation Manager as your protected-mode shell, you'll have to open a full-screen



COLOR.EXE's Foreground and Background Color Codes

Background		Foreground	
Black	x	Intense black	X
Blue	b	Intense blue	B
Green	g	Intense green	G
Cyan	c	Intense cyan	C
Red	r	Intense red	R
Magenta	m	Intense magenta	M
Yellow (Brown)	y	Intense yellow	Y
White	w	Intense white	W

Figure 1: Color attributes are denoted by the character codes shown above. An uppercase letter represents an intensified attribute, while a lowercase letter represents a normal (unintensified) attribute. Background colors may take on any of the eight normal attributes; foreground colors may be set to any of the 16. Note that black is assigned the letter x to avoid confusion.

■ UTILITIES

command line window before you run it—or before it would even make sense to run it. COLOR works in text-based command line sessions only. And it doesn't affect the way application programs present their screen colors—only the way OS/2 paints its command line screen.

COLOR accepts two single-character command line parameters that specify the desired foreground and background attributes, respectively. Its syntax is

COLOR *fb*

where *f* is the foreground letter and *b* the background letter, as shown in Figure 1. Except for black, the letters you enter are simply those that begin the name of the color—for red, *b* for blue, and so on. To avoid conflict with the *b* in blue, black is assigned the letter *x*.

When specifying foreground colors,

capital letters designate the "bright" ("intense") color and lowercase letters designate normal intensity—*G* for bright green

■ Two single-character command line parameters specify foreground and background attributes.

and *g* for normal green, for example. This creates a range of 16 different attributes (eight colors with two intensities each) to choose from. Background colors are limited to the eight lowercase attributes; attempting to specify an intense background

attribute will produce the error message "Invalid color ID."

For example, to set the screen colors for intense white-on-blue, you would enter

COLOR Wb

Similarly, to revert to the default colors, unintensified white on a black background, you can enter

COLOR wx

Alternatively, you can restore the default colors by disabling the ANSI processing of screen and keyboard escape sequences, as explained below.

THE ANSI DRIVER Unlike DOS, in which ANSI.SYS must be loaded (if used) with a `DEVICE=` statement in your `CONFIG.SYS` file, OS/2 builds ANSI functionality into the kernel itself. Escape se-

A TALE OF TWO LANGUAGES

The source code listing for COLOR.EXE is presented here (and is available for downloading from PC MagNet) in two different forms. COLOR.ASM is an assembly language version, and COLOR.C is written in C language. The COLOR.BAS listing and the executable file COLOR.EXE were derived from the version assembled using MASM 5.1. Although functionally identical to its assembly language counterpart, the .EXE file obtained when you compile the C source with Microsoft C 5.1 is lengthier and somewhat different in content.

Note that in either case a current (5.1) version of MASM or of Microsoft's C compiler is required.

The OS/2 API (Application Programming Interface) was designed to effect a smooth interface to high-level languages (such as C) that pass arguments to functions on the stack rather than in CPU registers. Nonetheless, OS/2 can be efficiently programmed in assembly language, and when a program is as short as COLOR.EXE, it can often be written with equal ease in either medium. The advantage to writing in assembler is the reduced length of the executable file. The

version of COLOR.ASM derived from COLOR.ASM is a mere 1,239 bytes in length; the equivalent executable file generated from COLOR.C weighs in at more than 8,000 bytes. Thus, COLOR.C is presented here primarily for comparative purposes.

If you download COLOR.ASM and assemble it yourself, be sure to include the Module Definition File listed in Figure A in the link phase. As used here, the Module Definition File specifies the

```
NAME COLOR
STACKSIZE 4096
PROTMODE
```

Figure A: The COLOR.DEF file shown above is required for the linking step in assembling COLOR.ASM with MASM 5.1.

name of the program, that it will run in protected mode only, and the stack size. Stack space may alternatively be declared and reserved in the source file itself (in `DGROUP`), but this would result in a larger .EXE file.

To assemble COLOR.ASM yourself, construct the Module Definition File

COLOR.DEF with a text editor (or download it from PC MagNet) and enter the following commands:

```
MASM COLOR;
LINK COLOR, ,NUL,DOSCALLS,COLOR;
```

The link step will work only if `DOSCALLS.LIB` is in a directory named in your current `LIB` path. `DOSCALLS.LIB` is supplied with C 5.1. If you have Version 1.06 of the Microsoft OS/2 Software Development Kit (SDK), you can substitute `OS2.LIB` instead.

If you choose to compile COLOR.C, you'll need the Microsoft C compiler 5.1 installed with DOS and OS/2 support. Then enter

```
cl -lp -g2 color.c
```

`lp` and `G2` are command line switches that instruct the C compiler to compile for protected mode and generate code for the 286, respectively. (COLOR.ASM contains a .286 directive, which is equivalent to the `G2` switch for the C compiler.) It makes sense to take advantage of 286-specific instructions when writing OS/2 utilities, since OS/2 requires at least a 286 to operate.—Jeff Prossie


```

COLORS use the 06/2 ANSI driver to set screen foreground and background
1 colors in protected mode. Syntax is:
2
3 COLOR fb
4
5 where f = foreground color (X,Z,S,H,G,C,R,F,M,B,Y,V,W,U), and
6 h = background color (X,B,G,C,R,F,M,B,Y,V,W,U)
7
8 Assemble with: NASM COLOR;
9 Link with: LINK COLOR, /NUL,DOSCALLS,COLOR;
10
11 Module Definition File (COLOR.DEF):
12 NAME COLOR
13 STACKRES 4096
14 PROTNOS 0
15
16 Copyright (c) 1989 Elf Communications Co.
17 Written March 1989 for PC Magazine by Jeff Prieske
18
19 .286
20
21 extrn DosExit:far
22 extrn ViSetAttr:far
23 extrn ViWriteTTY:far
24
25 DGROUP group _DATA
26
27 _DATA segment word public 'DATA'
28
29 ErrTat1 db "Usage: COLOR fb",13,10
30 TxtLen1 equ $ - ErrTat1
31
32 ErrTat2 db "Invalid color id",13,10
33 TxtLen2 equ $ - ErrTat2
34
35 SecSeq db 27,"[8]",0 dup (7)
36 EctLen equ $ - SecSeq
37
38 FCodes db "KBGRGRTV"
39 BCodes db "abgrgryv"
40
41 FAnsCodes db "37; 32; 35; 31; 36; 32; 36; 38;"
42 BAnsCodes db "47a 43b 45a 41a 46a 42a 48a 44a"
43
44 _DATA ends
45
46 _TEXT segment word public 'CODE'
47 assume cs:_TEXT, ds:DGROUP
48
49 ;; MAIN is the main body of the program.
50
51 main proc far
52
53 mov es,ax ;move esv selector into ES
54 cld ;point di to command line
55 cld ;clear direction flag
56 xor esi,0 ;ifind first null byte
57 repne scasb
58
59 next_char: cmp esi,[di+70h] ;skip leading spaces
60 jne get_entry
61 inc di
62 jmp next_char
63
64 ;build the foreground portion of the ANSI escape string.
65
66 get_entry: mov al,[esi+di] ;get foreground ID code
67 or al,0 ;see if a foreground code
68 jns check_next ; was entered
69
70 error1: push ds ;display error message
71 push offset DGROUP:ErrTat1 ; and exit if no
72 push TxtLen1 ; valid
73 call ViWriteTTY
74
75 error2:
76
77 push 1 ;exit with return code of 1
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```

COLOR.ASM: *The assembly language source code for the OS/2 color-setting utility, COLOR.EXE.*

[illegible]

(continues)

segment of the start of the command line.

In protected mode, segment registers are loaded with *selectors* rather than with segment addresses. This allows the CPU to check for memory access violations (hence, *protected* mode), to access more than 1MB of memory, and to implement virtual memory management techniques. Selectors are indexes into a table of descriptors maintained in memory by the operating system. The descriptors point to physical segments, which are denoted with 24-bit segment addresses. To access the command line, COLOR loads the environment selector into ES and the offset of the command line into DI. Afterwards, data can be read from the address represented by ES:DI just as if the program were operating in real mode and ES contained a physical segment address.

The first ASCII string in the command line is "COLOR," the name of the program itself. This corresponds to a `argv[0]`

in C syntax. This string is delimited by a binary zero, after which comes the text of the remaining command line entries. This command tail is delimited by two consecutive 0s, which mark the end of the environment segment. If a program erroneously attempted to read past the second 0, the CPU would trigger a General Protection fault, signaling that the memory access would violate segment boundaries. OS/2 would then step in and terminate the program.

COLOR skips past the program name and obtains the foreground and background color codes from the command tail, then compares them with a table of valid color designators contained in the data segment. If found, a code is converted into the equivalent character string that commands the ANSI driver to select the corresponding screen color. The escape sequence is built and is then transmitted to standard output using the kernel API func-

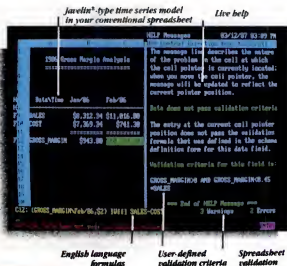
tion `VioWrTTY`. If an invalid code is entered, COLOR responds with "Invalid color ID." If one or both of the color codes is missing from the command line, the message "Usage: COLOR fb" is displayed.

Before calling `VioWrTTY` to send the escape codes, COLOR calls `VioSetAnsi` to make sure the ANSI driver is active. `VioSetAnsi` takes two word-sized arguments, which COLOR pushes onto the stack just before the call. The first, a 1, designates that ANSI operation is to be enabled. (A value of 0 would disable it.) The second argument is a Vio handle that is simply set to 0 for our purposes.

COLOR uses a new type of PUSH instruction to store immediate values on the stack. One of the advantages of writing code for OS/2 is that you can use instructions specific to the 286 and 386. The instruction `PUSH 1`, for example, is valid on a 286, but not on an 8088 or 8086. The

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■ UTILITIES

same operation on an earlier PC would require two discrete operations, which might look something like this:

```
MOV AX, 1
PUSH AX
```

COLOR also takes advantage of 286-specific instructions when it performs multiple bit shifts. The instruction SHL BX, 1, for example, is valid for all Intel CPUs, but SHL BX, 2 works only on 286 and 386 machines. On an 8088, you'd first need to load the CL register with the shift count (in this case 2), and then execute the SHL BX, CL instruction. Again, the 286 method is cleaner, faster, and more concise. It's important to note, however, that if you

plan to use 286-specific instructions, you must notify MASM by including a .286 directive at the top of the source file.

When its work is finished, COLOR terminates by calling the OS/2 function DosExit with arguments of 1 and 0: 1 to terminate the process, 0 to return a termination code of 0. When COLOR terminates after an error, it supplies a return code of 1 to the parent process that invoked it.

Obviously, there's a great deal more to OS/2 assembly language programming than this. For more information, you should refer to past and continuing installments of *PC Magazine's* Power Programming and Environments columns and to Ray Duncan's excellent guide to the OS/2

kernel, *Advanced OS/2 Programming* (Microsoft Press, 1989). If you want to learn more about the 286 itself, there are any number of books documenting the chip's internals. A favorite of mine is Ed Strauss's *Inside the 80286* (Prentice-Hall, 1986), which contains more detail than most of us will ever need to know about writing protected-mode operating systems around the 286 processor.

TOWARD THE FUTURE The OS/2 environment is a whole new ball game for users and programmers alike. COLOR .EXE is just the first example of how a simple utility can live up to this operating system, just as our past and continuing se-

```

*
* COLOR uses the OS/2 ANSI driver to set screen foreground and
* background colors in protected mode. System io:
*
* COLOR.Cb
*
* where f = foreground color (B,G,R,G,C,C,R,R,M,M,Y,Y,M,W), and
* b = background color (B,G,R,G,C,C,R,R,M,M,Y,Y,M,W)
*
* Compile and link with: cl -lp -D2 color.c
*
* Copyright (c) 1988 Riff Communications Co.
* Written March 1988 for PC Magazine by Jeff Preston
*/

#include <stdio.h>
#include <string.h>

#define API unsigned short far *pascal
API DosExit(int, int);
API WinMktxt(char far *, int, int);

unsigned char ForeColor, BackColor;
unsigned short BackLength = 0;
char BackColor[16] = "1234567890ABCDEF";

char *ForeColor[8] = { "00", "34", "23",
                      "34", "23", "23",
                      "23", "23" };

char *BackColor[8] = { "40", "40", "40",
                      "40", "40", "40",
                      "40", "40" };

char *ErrMsg1 = "Usage: COLOR f b";
char *ErrMsg2 = "Invalid color ID";

main(int Argc, char *Argv[])
{
    if (Argc < 2)
        printf("b/a\n", ErrMsg1);
    if (strlen(Argv[1]) < 2)
        printf("b/a\n", ErrMsg1);
    DosExit(1, 1);

    switch(Argv[1][0]) {
        case 'f':
            BackLength += 2;
        case 'g':
            ForeColor = 0;
            break;
        case 'b':
            BackLength += 2;
        case 'B':
            BackColor = 1;
            break;
        case 'c':
            BackLength = 2;
        case 'C':
            ForeColor = 2;
            break;
        case 'C':
            BackLength += 2;
        case 'c':
            ForeColor = 3;
            break;
        case 'B':
            BackLength += 2;
    }

    atexit(BackColor, BackColor[BackLength]);
    WinMktxt(1, 0);
    WinMktxt(BackColor, BackLength, 0);
    DosExit(1, 0);
}

```

```

case 'f':
    ForeColor = 4;
    break;
case 'B':
    BackLength += 2;
case 'B':
    ForeColor = 5;
    break;
case 'f':
    BackLength = 2;
case 'f':
    ForeColor = 6;
    break;
case 'B':
    BackLength += 2;
case 'B':
    ForeColor = 7;
    break;
default:
    printf("b/a\n", ErrMsg2);
    DosExit(1, 1);
}

if (BackLength == 0)
    atexit(BackColor, "1");
atexit(BackColor, ForeColor[ForeColor]);
BackLength = 3;

switch (Argv[1][1]) {
    case 'a':
        BackColor = 0;
        break;
    case 'b':
        BackColor = 1;
        break;
    case 'g':
        BackColor = 2;
        break;
    case 'B':
        BackColor = 3;
        break;
    case 'c':
        BackColor = 4;
        break;
    case 'B':
        BackColor = 5;
        break;
    case 'f':
        BackColor = 6;
        break;
    case 'B':
        BackColor = 7;
        break;
    default:
        printf("b/a\n", ErrMsg2);
        DosExit(1, 1);
}

atexit(BackColor, BackColor[BackLength]);
BackLength = 2;
WinMktxt(1, 0);
WinMktxt(BackColor, BackLength, 0);
DosExit(1, 0);
}

```

COLOR.C: Although it compiles into a longer executable file, COLOR.C presents an instructive C language version of the COLOR .EXE source code. If you choose to compile COLOR.C, you'll need the Microsoft C Compiler 5.1 installed with DOS and OS/2 support.



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■ UTILITIES

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COLOR OS/2 Command

Jeff Prorise

June 13, 1989 (Utilities)

Purpose:

A protected-mode utility for setting foreground and background screen colors from the full-screen (text) command line in OS/2, Standard Editions 1.0 and 1.1.

Format:COLOR *fb***Remarks:**

The *f* and *b* command line parameters are letters designating the foreground and background screen colors, as shown in the table below. Capital letters are used to specify an "Intense," or "bright," color (foreground only); lower-case letters indicate normal-intensity colors (foreground and background). Colors are designated by the first letter of their names with the exception of black, which is represented by *x* (or *X*).

Background		Foreground	
Black	x	Intense black	X
Blue	b	Intense blue	B
Green	g	Intense green	G
Cyan	c	Intense cyan	C
Red	r	Intense red	R
Magenta	m	Intense magenta	M
Yellow (Brown)	y	Intense yellow	Y
White	w	Intense white	W

The default white-on-black colors can be restored either by entering **COLOR wx** or by issuing the command **ANSI OFF** and clearing the screen. If **ANSI ON** is then issued, the last-selected color scheme will return. The default ANSI drivers in OS/2 support 43- and 50-line text modes as well as 25-line text modes.

Note:

If the Presentation Manager is used, windowed applications provide their own color information. COLOR.EXE is used only for full-screen command line operation.

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PRODUCTIVITY

■ UTILITIES

ries of utilities can improve the look and feel of DOS.

Some DOS utilities will never be duplicated for OS/2 because OS/2 doesn't contain the necessary programming hooks. I had originally intended, for example, to include within COLOR.EXE a cursor-shaping utility comparable to CTTYPE.COM, which appeared here in our November 10, 1987, issue. It turned out, however, that while OS/2 allowed an application program to alter the cursor temporarily, the cursor always returned to its original shape when you got back to the command line.

The intent was clear: to present a consistent command line interface to every OS/2 user, and to make sure that the cursor was there even if a wayward application program forgot to turn it on after first turn-

■ The OS/2 environment is a whole new ball game for users and programmers. COLOR is an example of how a simple utility can liven up this operating system.

ing it off. The trade-off for consistency is flexibility. Even OS/2 has its limitations, so if you don't like OS/2's double-underline cursor, you'd better get used to it anyway: you're stuck with it.

DOS users still far outnumber the growing OS/2 cadre, and the editors of PC Magazine aren't about to abandon DOS utilities in favor of OS/2. But you can expect to see increased coverage of OS/2 in the Utilities column. Like DOS, OS/2 is a powerful operating system. But also like DOS, OS/2 isn't perfect, so we'll always need utilities to achieve full productivity from our machines. [E]

Jeff Prossie is a contributing editor of PC Magazine.

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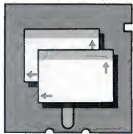
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■ ENVIRONMENTS ■ CHARLES PETZOLD

PM FUNCTIONS IN NON-PM PROGRAMS



As a rule, Presentation Manager functions can be called only from within PM programs. As INISHOW.EXE demonstrates, however, rules can sometimes be broken.

“How can I use Presentation Manager facilities without actually writing a Presentation Manager program?” That’s a question I know I’m going to hear often as more and more programmers begin to move from DOS to the OS/2 kernel and Presentation Manager environments.

In general, the answer will be simple: no way. The question is equivalent to calling your travel agent and asking how you can fly from New York to Los Angeles without actually leaving the ground.

Porting a DOS program to the OS/2 kernel is usually not a major undertaking. In many cases, you can replace interrupt 21h and BIOS function calls with equivalent OS/2 function calls and replace your screen writing logic with OS/2 VIO (video I/O) functions. If you originally wrote the program in C (or another high-level language), much of the program may simply need to be recompiled.

But porting the same DOS program to the OS/2 Presentation Manager is another matter altogether. You’ve probably already heard that Presentation Manager programming requires no small amount of learning and work, and that porting an entire application to the PM may require extensive restructuring. Understandably, you’d rather not bother with such a major undertaking right away. So your first impulse is to see if you can ease your program into the Presentation Manager by replacing some components with PM facilities while still keeping the rest of the application more or less intact.

Your program’s menu would seem like

a good place to begin. Since the Presentation Manager includes menu logic of its own that programs can use, it certainly seems reasonable simply to remove the menu logic in your program and replace it with a few PM function calls.

BUT IT CAN’T BE DONE As soon as you start considering exactly how you would add a Presentation Manager menu to your program, however, you run into a brick wall. A Presentation Manager menu is a “window,” which uses “messages” to tell the program when a user has selected a menu item. An OS/2 kernel program has no way to receive such messages. In fact, the program can’t even create the menu window because messages from the window have no place to go.

As I explained in a previous issue (May 16, 1989), before it can create a Presentation Manager menu (or any other window), a program must create a message

queue by calling `WinCreateMsgQueue`. It is the presence of this function that distinguishes a Presentation Manager program from a non-PM program.

The object-oriented message-driven architecture of the Presentation Manager is radically different from the conventional structure of DOS and OS/2 kernel programs. While it is a great advance and opens up a wide range of potentials for applications, it also imposes certain initially demanding and annoying restrictions.

For example, a Presentation Manager program can no longer use the `C printf` function for writing text to the screen. The `printf` function doesn’t make any sense in a PM program because a program can create multiple windows and `printf` does not indicate on what window the text should appear. Under the PM, the `printf` function is like a function call to open a file that does not allow a filename to be specified.

Abandoning an old friend like `printf` can be painful. And the prospect of adapting your personal programming style to the new architecture can be unnerving. That’s obviously why you may find yourself wishing to use Presentation Manager facilities in a more traditional and familiar programming environment. What I fear is that some programmers will spend an inordinate amount of time working on kludges that allow this. I’ve already wasted enough of my own time working on ways to use Presentation Manager graphics from a non-PM program, so I know what this is like! I also know that this time can be more profitably spent learning how to write Pre-

■ **PM programming requires no small amount of learning and work, and porting an entire application may require extensive restructuring.**

■ ENVIRONMENTS

sensation Manager programs. If you want to fly, you have to leave the ground.

BUT MAYBE ... The lecture's over. Now let's break a few rules.

It is true, as I've said, that a program that creates a window must first create a message queue, and that a program with a message queue is a Presentation Manager program and must be structured like one.

But there are *some* PM facilities that don't involve windows. Can we use these facilities within a conventionally structured program? Yes, we certainly can, and let's do it.

First, some background. Many applications need to store program initialization or configuration data. A word processing program, for example, might need to keep the user's preferences for screen colors, margins, default fonts, and so forth. In the Presentation Manager, this information is known as "profile data," and there are several functions that allow programs to store and retrieve it.

We saw how this worked in the second version of the *TIMELINE* program in my April 11, 1989, column. *TIMELINE* uses the *WinWriteProfileData* function to save its position on the screen and *WinQueryProfileData* to read the position the next time the program is run.

As I discussed in that column, this information is stored in a file named *OS2.INI*. *OS2.INI* is created when *OS/2 1.1* is installed, and several programs included with the operating system use it: *Start Programs* uses it to store information on installed programs; the *Control Panel* uses it to store information on system colors, printer drivers, and font files; the *File System* program uses it to store display preferences. Other PM applications can use it to store whatever they want.

OS2.INI normally resides in the

C:\OS2 directory, but it can actually be stored in any directory. Indeed, it need not even be named *OS2.INI*: the name and directory of the file is specified in the *PROT-SHELL* statement in *CONFIG.SYS*. (If the file specified there does not exist, then *OS/2* will use *C:\OS2\OS2.INI* instead.)

WIN.INI AND OS2.INI The *WIN.INI* file created by *Microsoft Windows* in the *\WINDOWS* directory is in many ways similar to *OS2.INI*, and the functions that *Windows* provides applications to use *WIN.INI* are similar to the Presentation Manager functions.

The most significant difference is that *WIN.INI* is an editable ASCII file, while *OS2.INI* is a binary file. The *Windows* documentation includes information on changing *WIN.INI* settings. You can make such changes directly, by simply loading the file into any text editor or *Windows*' own Notepad program.

Under the Presentation Manager, directly editing the *OS2.INI* file is not possible, though much of the system information in *OS2.INI* can be changed by using the Presentation Manager Control Panel program. The editing difficulties arise not only because *OS2.INI* is a binary file, but also because the Presentation Manager keeps the *OS2.INI* file open with a "deny write" sharing mode. That means that other programs cannot open *OS2.INI* for writing. Programs can store information in *OS2.INI* only through PM functions, such as *WinWriteProfileData*.

Anyway, the point is that it becomes a nontrivial task to see everything that's stored in *OS2.INI*. I recently wanted to see how information about printer drivers is stored in *OS2.INI* but found there was no way I could look at its contents.

Of course, where there's a need there's also an opportunity to write a program to

solve the problem. That program is *INISHOW*. *INISHOW* uses the normal *WinQueryProfileData* and *WinQueryProfileString* to retrieve information stored in *OS2.INI* and display it in a readable format.

WHEN PM IS OVERKILL My original plan was to write *INISHOW* as a Presentation Manager program. After all, the *WinQueryProfileData* and *WinQueryProfileString* functions are Presentation Manager functions, and generally only PM programs can use PM functions.

As I started working on the program, however, I realized that the Presentation Manager was making the program more complex than it needed to be. The Presentation Manager is great for interactive programs, programs that use graphics, menus, dialog boxes, and the mouse. But all I wanted to do with *INISHOW* was display some text and look at it. This was obviously a job for the *C printf* function and simple teletype output.

As Emerson said, "a foolish consistency is the hobgoblin of little minds." While it may sound like heresy coming from me, there are some programs for which the Presentation Manager is overkill. *INISHOW* is one of them. It might have been nice to display *OS2.INI* contents in a window and let the user scroll through it using Presentation Manager scrollbars, but for something as simple as this it's really just as convenient to run the program on a command line. If necessary, output can be redirected to a file and browsed later on.

Most interesting, as it turns out, is the fact that the Presentation Manager functions we need in this program, such as *WinQueryProfileData* and *WinQueryProfileString*, can be safely called from non-PM programs. That makes the program relatively simple.

THE INISHOW PROGRAM The three files you need to create *INISHOW* are shown in Figures 1, 2, and 3. Using the IBM or Microsoft *OS/2 1.1* Programmer's Toolkit and C compiler, you can create *INISHOW.EXE* simply by running the *MAKE* program on the *INISHOW* make file, thus:

MAKE INISHOW

```
#-----
# INISHOW make file
#-----

inishow.obj : inishow.c
               cl -c -G2 -W3 inishow.c

inishow.exe : inishow.obj inishow.def
               link inishow, /align:16, NUL, os2, inishow
```

Figure 1: The *INISHOW* make file automates creation of *INISHOW.EXE* from its component files.

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■ ENVIRONMENTS

Or, you can download INISHOW.EXE from PC MagNet. Note that the program requires OS/2 1.1.

Data stored in OS2.INI is tagged with an application name and a key name. When application programs use OS2.INI

to store information, the application name is usually the name of the program. The key name is anything the program wants it to be. Some system information is stored in OS2.INI with application names that describe the data. The data itself is stored in

either a string or a binary format.

INISHOW displays the application names and key names in square brackets. Key names are indented one tab space. The actual data is indented two tab spaces. Binary data is displayed in a hexadecimal

```

/*
INISHOW.C - Displays OS2.INI information in OS/2 1.1
(C) 1989, Ziff Communications Co.
PC Magazine + Charles Petzold, 1/89
*/

#include INCL WINSHLDATA
#include <os2.h>
#include <ctype.h>
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

#define BYTES 8 // Bytes of binary data per display line

int main (void)
{
    BOOL fistring;
    CHAR szBuffer[4 * BYTES + 16];
    HAB hab;
    INT iQueryApp, iQueryKey, iOff, iByte, iLen;
    UCHAR *pchQueryApp, *pchQueryKey, *pchQueryStr;
    USHORT ccbData;

    hab = WinInitiales (0); // Allocate memory for application names

    if (WinQueryProfilesize (hab, NULL, NULL, ccbData))
    {
        fputs ("INISHOW: Cannot obtain any profile data.\n", stderr);
        return 1;
    }

    if (NULL == (pchQueryApp = malloc (ccbData)))
    {
        fputs ("INISHOW: Cannot allocate memory for application names.\n",
            stderr);
        return 1;
    }

    // Get list of application names and scan
    WinQueryProfilestring (hab, NULL, NULL, "", pchQueryApp, ccbData);
    iQueryApp = 0;

    while (pchQueryApp[iQueryApp] != '\0')
    {
        printf ("%s\n", pchQueryApp + iQueryApp);
        // Allocate memory for key names
        WinQueryProfilesize (hab, pchQueryApp + iQueryApp, NULL, ccbData);
        if (NULL == (pchQueryKey = malloc (ccbData)))
        {
            fputs ("INISHOW: Cannot allocate memory for key names.\n",
                stderr);
            return 1;
        }

        // Get list of key names and scan
        WinQueryProfilestring (hab, pchQueryApp + iQueryApp, NULL, "",
            iQueryKey = 0, pchQueryKey, ccbData);

        while (pchQueryKey[iQueryKey] != '\0')
        {
            // Get size of data
            WinQueryProfilesize (hab, pchQueryApp + iQueryApp,
                pchQueryKey + iQueryKey, ccbData);
            if (NULL == (pchQueryStr = malloc (ccbData)))
            {
                fputs ("INISHOW: Cannot allocate memory for data.\n",
                    stderr);
                return 1;
            }

            printf ("\t(%s)\n", pchQueryKey + iQueryKey,
                ccbData == 8 ? " -- NO DATA" : "");
            if (ccbData == 8)
                continue;
            // Determine if data is string
            // or stored in a binary format
            fistring = (ccbData > 1) ? TRUE : FALSE;
            if (fistring)
            {
                WinQueryProfilestring (hab, pchQueryApp + iQueryApp,
                    pchQueryKey + iQueryKey, "",
                    pchQueryStr, ccbData);
                // Check if string length matches
                if (ccbData != strlen (pchQueryStr) + 1)
                    fistring = FALSE;
            }
            // Check for printable characters
            if (fistring)
            {
                for (iByte = 0; iByte < ccbData - 1; iByte++)
                {
                    if (!isprint (pchQueryStr[iByte]))
                        fistring = FALSE;
                }
                // If a string, display it
                if (fistring)
                    printf ("\t\t%s\n", pchQueryStr);
            }
            else
            {
                WinQueryProfiledata (hab, pchQueryApp + iQueryApp,
                    pchQueryKey + iQueryKey,
                    pchQueryStr, ccbData);
                for (iOff = 0; iOff < ccbData; iOff += BYTES)
                {
                    iLen = sprintf (szBuffer, "\t\t%04X ", iOff);
                    for (iByte = iOff; iByte < iOff + BYTES; iByte++)
                    {
                        if (iByte < ccbData)
                            iLen += sprintf (szBuffer + iLen, "%02X ",
                                pchQueryStr[iByte]);
                        else
                            iLen = strlen (strcat (szBuffer, " "));
                    }
                    szBuffer[iLen] = '\0';
                    for (iByte = iOff; iByte < iOff + BYTES; iByte++)
                    {
                        if (iByte < ccbData)
                            if (!isprint (pchQueryStr[iByte]))
                                szBuffer[iLen++] = pchQueryStr[iByte];
                        else
                            szBuffer[iLen++] = ".";
                    }
                    szBuffer[iLen] = '\0';
                    puts (szBuffer);
                }
                // Next key name
                free (pchQueryStr);
                iQueryKey += strlen (pchQueryKey + iQueryKey) + 1;
            }
            // Next application name
            free (pchQueryKey);
            iQueryApp += strlen (pchQueryApp + iQueryApp) + 1;
        }
        // Clean up and terminate
        free (pchQueryApp);
        WinTerminate (hab);
        return 0;
    }
}

```

Figure 2: INISHOW.C is the source code for a program that lets you see the contents of an OS2.INI file.

```

;-----
; INISHOW.DEF module definition file
;-----

NAME INISHOW WINDOWCOMPAT

DESCRIPTION 'Display OS2.INI information (c) 1989, Ziff Communications Co.'
PROTODOME

```

Figure 3: The INISHOW.DEF module definition file includes information LINK uses to create INISHOW.EXE.

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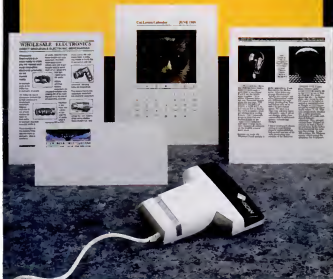
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originated in mainframe technology and apparently has no real meaning for the Presentation Manager.)

Actually, the WinInitialize function is not strictly required in INISHOW. You can remove the function (along with WinTerminate), set hab to NULL, recompile, and the program will still run fine. But I think it's best for future compatibility to leave these function calls in the program.

NO VERSION CHECK? I mentioned earlier that INISHOW requires OS/2 1.1. This being so, you may have expected to see a call in INISHOW to the DosGetVersion function. In fact, the call would be superfluous.

The INISHOW.EXE file contains information that indicates which dynamic-link libraries the program uses. WinIni-

■ **INISHOW.EXE** has information that indicates which dynamic-link library the program uses.

tialize and WinTerminate are located in PMWIN.DLL, and the other Presentation Manager functions in INISHOW are located in PMSHAPI.DLL ("PM Shell API"). Neither of these two dynamic-link libraries is included in OS/2 1.0.

Thus, if you try to run INISHOW under OS/2 1.0, you'll get the message "SYS1804: The system cannot find the file PMSHAPI." The program doesn't get loaded and so never even gets an opportunity to check the version number.

THE ALLOWABLE FUNCTIONS

Now that we have seen how some Presentation Manager functions can be used in a non-PM program, you may be wondering about a complete list of the allowable functions. Unfortunately, I have never seen such a list.

The closest I've come is a list of functions that can be called from a nonmessage-queue thread of a Presentation Manager program. When a PM program



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creates a message queue, the queue is used for windows created in that thread; the program can also create other threads that do not create message queues.

The functions that these queueless

threads can call are listed on page 4-2 of Volume 1 of IBM's *OS/2 Technical Reference Version 1.1* manual. (As of this writing, I haven't seen Microsoft's final OS/2 1.1 technical references.) Basically, a

queueless thread cannot send a message to a window or call a function that causes a message to be sent.

It makes sense that a non-PM program can use a subset of the functions allowed from queueless threads. Unfortunately, however, the list in the IBM manual is not complete. It doesn't even include WinInitialize, for example, which I know is sometimes required in queueless threads.

Determining which PM functions you can use in a non-PM program therefore requires some experimentation and a little common sense. Certainly you cannot create a window in a non-PM program. Creating a window requires that the program thread first create a message queue. Many

■ **Determining which PM functions you can use in a non-PM program requires experimentation and a little common sense.**

of the functions beginning with the Win prefix require a window handle as the first parameter. These functions are obviously out of the question unless the non-PM program somehow gets a handle to a window created by a PM program. (Actually, that's not an impossible thing to do.)

Graphics for the video display are also closely tied to windows. In order to draw graphics a program must obtain a handle to a presentation space, which is usually associated with a particular window in the Presentation Manager session.

While it's nice to be able to write a simple program like INISHOW that does what you want in a traditional program that uses `printf` for output, you're obviously limited in the Presentation Manager functions you can use this way. You can experiment all you want, but don't lose sight of the real advantages of the Presentation Manager. The benefits gained from learning and utilizing its more complex program structure far outweigh one's desire to continue using `printf`. □

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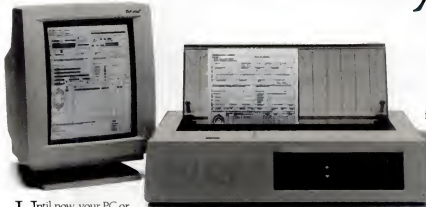
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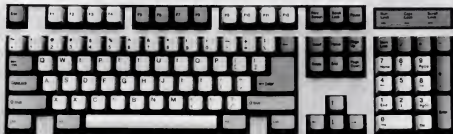
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USING EXTENDED MEMORY, PART 2



Accessing memory in protected mode requires a very different addressing system from that used by regular DOS programs. The program examples here will get you started.

As you'll recall from my last column, *conventional memory* is the RAM below the 1MB boundary. This area can be addressed by any member of the 80x86 family, including the 8086 and 8088. *Extended memory* is the RAM at addresses above 1MB, and this area of memory can be accessed by an 80286 or 80386 CPU only when it is running in protected mode. Because DOS and its applications run on 80286 and 80386 machines in real mode, they are confined to conventional memory. Ordinarily, then, even these more-advanced CPUs cannot use extended memory for program execution or data storage.

As we saw last time, however, the ROM BIOS does support two functions that allow DOS programs to access extended memory in a hardware-independent, albeit primitive, manner. Interrupt 15h function 87h copies a block of data from any location in conventional or extended memory to any other location, and interrupt 15h function 88h returns the total amount of extended memory installed in a system. The parameters and results for these two functions were documented in the last issue, and I also noted there that the parameter block required by interrupt 15h function 87h is actually a "partially filled-in global descriptor table."

But what exactly is a global descriptor table? That question requires a brief detour into the mysterious world of protected-mode memory addresses.

80x86 processors view memory in exactly the same way: as a linear array of bytes. 8086/88 CPUs have 20 address lines (A0 through A19) that generate 20-bit physical addresses (ranging from 00000h to FFFFFh), which provides access to 1MB of storage. An 80286 processor has 24 address lines, allowing it to access 16MB of RAM. And the 80386 processor has 32 address lines, which allow you—if you can afford it—to install an astonishing 4 gigabytes of RAM.

When an 80286- or 80386-based PC is running in real mode, however, the upper address lines (A20 and above) are usually disabled. This makes the machine act more like an 8086: if an address above 1MB is generated, it "wraps around"—in effect, the upper bits of the address are discarded.

How, then, does the CPU get from the 16-bit registers that we all know and love to a 20-bit (or larger) physical address? In real mode, the process is really quite simple. The contents of a segment register are shifted left 4 bits and then added to a 16-bit offset or displacement. Which specific segment register is normally used depends on the instruction type, but the default can almost always be overridden to suit the needs of the individual programmer. The offset or displacement value may come from the machine instruction that is being executed, from one or more index registers, or from some combination of these elements.

When operating in protected mode, an 80286 or 80386 uses a very different method to generate physical addresses. Here the numbers in segment registers no longer di-

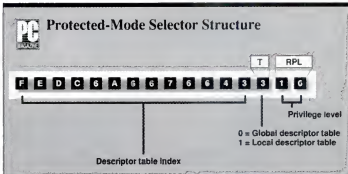


Figure 1: Bits 3-F of a protected-mode selector form an address that serves as an index to a particular descriptor (see Figure 2) in a descriptor table.

TALKING TO MEMORY At the level of physical interconnections, all Intel

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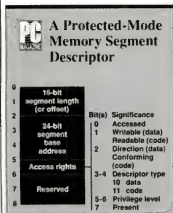


Figure 2: This structure represents a descriptor for a protected-mode memory segment with program code or data. Bytes 0-4 form a 24-bit base address plus 16-bit offset (see Figure 3) that represents a 24-bit physical address.

rectly correspond to anything. Instead, they are treated as *tokens* or *selectors* that only indirectly represent an address. As illustrated in Figure 1, a selector is composed of several bit fields. However, the most important field is an index to an entry—called a descriptor—which is found in a descriptor table. Descriptor tables are special data structures that are manipulated by the operating system and interpreted by the CPU hardware. Each descriptor is 8 bytes long and describes the characteristics of a particular memory segment, including

its physical base address and its length (Figure 2).

When the CPU hardware needs to generate a physical address in protected mode, it first uses the selector in the current machine instruction's default segment register to identify a descriptor and fetches the corresponding physical base address. (As in real mode, the default segment register can be overridden by the programmer when necessary.) The base address is then added to a 16-bit offset or displacement—which might derive from the machine instruction, one or more index registers, or both. Together they will form the final linear memory address that is placed on the bus (Figure 3).

The advantage of this indirect scheme is that an application program does not need to know or care about the physical location of any particular chunk of memory that it owns. A selector is analogous to a file handle in that it is handed to an application at load time or in response to an operating-system function call. An application's valid selector for a particular memory segment will not change after the program is loaded, even though the operating system may move the actual contents of the segment around in physical memory (in order to unify free blocks) or even roll the segment out to a swap file on-disk (in order to make room for the execution of another program).

I've skirted or glossed over several protected-mode issues in the preceding paragraphs—such as segment attributes, privilege levels, and access rights—because

they aren't really germane to the DOS programmer who wants to use extended memory only for fast auxiliary storage. But from this description of the process, I'm sure at least one aspect of address generation has probably piqued your curiosity: if

■ Descriptor tables are special data structures that are manipulated by the operating system and interpreted by the CPU hardware. Each descriptor is 8 bytes long.

each protected-mode memory access requires several additional memory accesses to get a segment's base, size, and characteristics from a descriptor table, why isn't program execution in protected mode drastically slower than program execution in real mode?

Admittedly, some machine instructions are significantly slower in protected mode than in real mode, especially far jumps and calls. However, the 80286 and 80386 employ a clever trick to minimize the speed degradation associated with most other memory accesses. Whenever a segment

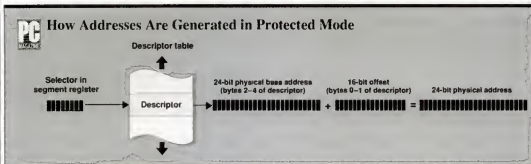


Figure 3: Generating a physical address in protected mode involves obtaining the physical base address of a given descriptor, then deriving an actual physical address from the base address and 16-bit offset stored in the descriptor.

register is loaded with a selector, the CPU caches the information from the corresponding descriptor in special on-chip shadow registers that are not otherwise accessible. It can then form physical addresses by using the contents of the shadow reg-

■ The easiest way to access extended memory in a C program is to encapsulate interrupt 15h function 87h function calls inside assembly-language subroutines.

isters without having to refer out to the actual descriptor tables that are in its main memory.

If you're interested in a more thorough introduction to protected mode, I recommend a little Intel booklet called "Introduction to the iAPX 286" (Part Number 210308-001). You can order it from the Intel Literature Department, 3065 Bowers Ave., Santa Clara, CA 95051. Follow that by reading Ed Strauss's book *Inside the 80286* (Brady Communications Co., New York, NY, 1986).

USING THE ROM BIOS FUNCTIONS

Now let's take a closer look at what is actually going on when we use the ROM BIOS interrupt 15h function 87h to access extended memory from a program we're writing. The descriptor table our program must supply to this function has room for six descriptors. The first descriptor is a dummy and corresponds to a null selector in the range 0000h-0003h. Null selectors get special treatment from the hardware in protected mode: they are safe values that you can always load into a segment register as long as you don't try to address anything with them.

Two of the descriptors supply the source and destination addresses of the memory block we are asking the ROM

BIOS to move on our behalf. These must be initialized with physical (linear) 24-bit base addresses, an appropriate length, and an access-rights byte of 93h. The remaining three descriptors are used by the ROM BIOS itself to provide addressability to its own code, data, and stack while it is executing in protected mode. Our program initializes these to zero, and the ROM BIOS takes it from there. An outline of the descriptor table used by interrupt 15h function 87h is shown in Figure 4.

The easiest way to access extended

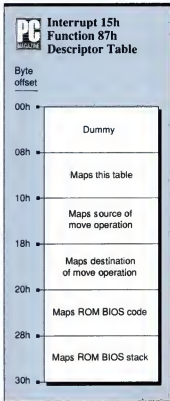


Figure 4: The two descriptors at offsets 10h and 18h are used to map the source and destination protected-mode addresses of the requested memory move operation. The descriptor at offset 00h is a dummy, and the remaining three descriptors are used by the ROM BIOS.

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memory in a C program is to encapsulate interrupt 15h function 87h function calls inside assembly-language subroutines. This lets you use more-sensible parameters. The EXTMEM.ASM listing shown in Figure 5 contains two examples of such routines, GETXMM and PUTXMM. Designed for use with small model programs, these two procedures are called with source and destination addresses and a length in bytes. The conventional memory

address is assumed to be a normal far pointer (segment and offset), while the extended memory address is a linear, physical address.

GETXMM and PUTXMM do all the necessary housekeeping required by the ROM BIOS. They convert addresses as necessary and place the addresses, lengths, and access-rights bytes into the descriptor table for you. Both routines return a false flag if the move was successful or a true flag if it

failed. In the latter case, the value of the flag is 1 if there was a memory parity error, 2 if an interrupt exception occurred, or 3 if extended memory could not be accessed because of a problem with the A20 address line.

The program SHOWXMEM.C (Figure 6) shows how to use GETXMM in your own C programs. SHOWXMEM prompts you for a hex, 24-bit, linear memory address in the range 000000h-FFFFFFh. It then dis-

<pre> title EXTMM --- get/put extended memory page 55,132 ; EXTMM.ASM --- Routines to transfer data between ; conventional and extended memory. ; For use with small model C programs. ; Copyright (c) 1989 Elitex Development Co. ; PC Magazine - Ray Duncan - June 13, 1989 ; ; Assemble with: NASM /o1 /m86 EXTMM; ; GROUP group _DATA _DATA segment word public 'DATA' </pre>	<pre> get db 30h dup (0) ; global descriptor table _DATA ends _TEXT segment word public 'CODE' assume cs:_TEXT,ds:GROUP args equ [bp+4] ; offset of arguments, small model source equ word ptr args dest equ word ptr source+4 </pre>
----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------	--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

(CONTINUED)

Figure 5: EXTMM.ASM contains two routines, GETXMM and PUTXMM, that allow "small" model C programs to transfer data between conventional memory and extended memory. Both programs are called with source and destination addresses and a length in bytes.

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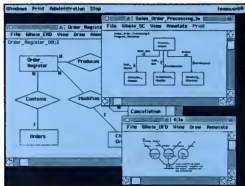


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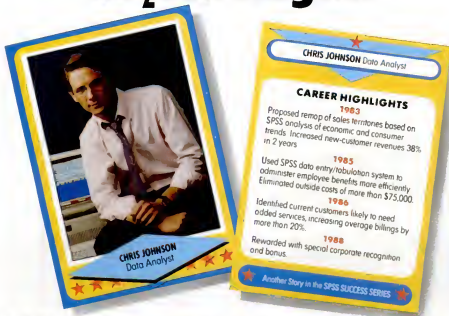
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■ POWER PROGRAMMING

```

; GETXM copies data from extended memory to conventional memory.
; status = GETXM(unsigned long source, void far *dest, unsigned long)
; Status is zero if move successful, nonzero if move failed:
; 1 = parity error, 2 = exception interrupt error, 3 = gate A20 failed

; PUTXM copies data from conventional memory to extended memory.
; status = PUTXM(void far *source, unsigned long dest, unsigned long)
; Status is zero if move successful, nonzero if move failed:
; 1 = parity error, 2 = exception interrupt error, 3 = gate A20 failed

; GETXM
public _getxm
proc _getxm
    push bp
    mov bp, sp
    push si
    push di
    push de
    pop es
    mov si, offset DEMO:putxm
    ; store access rights bytes
    mov byte ptr es:[si+15h], 93h
    mov byte ptr es:[si+16h], 93h
    ; store source address
    mov ax, source
    ; into descriptor
    mov es, source+2
    mov es:[si+14h], ax
    ; destination segment * 16
    mov ax, dest+2
    mov dx, 16
    mul dx
    add ax, source
    adc dx, 0
    mov es:[si+12h], ax
    ; store source address
    mov es:[si+14h], di
    ; into descriptor
    mov es, source
    ; store length into source
    mov es:[si+14h], cx
    ; and destination descriptors
    mov es:[si+16h], cx
    ; convert length to words
    mov ax, 15h
    ; Int 15h Pm 87h = block move
    ; transfer to ROM BIOS
    mov al, ah
    ; fore status in AX
    pop di
    pop si
    pop bp
    ; back to caller
_getxm endp

; PUTXM
public _putxm
proc _putxm
    push bp
    mov bp, sp
    push si
    push di
    push de
    pop es
    mov si, offset DEMO:putxm
    ; store access rights bytes
    mov byte ptr es:[si+15h], 93h
    mov byte ptr es:[si+16h], 93h
    ; store destination address
    mov ax, dest+2
    ; into descriptor
    mov es, dest+2
    mov es:[si+14h], ax
    ; source segment * 16
    mov ax, source+2
    mov dx, 16
    mul dx
    add ax, source
    adc dx, 0
    mov es:[si+12h], ax
    ; store source address
    mov es:[si+14h], di
    ; into descriptor
    mov es, source
    ; store length into source
    mov es:[si+14h], cx
    ; and destination descriptors
    mov es:[si+16h], cx
    ; convert length to words
    mov ax, 15h
    ; Int 15h Pm 87h = block move
    ; transfer to ROM BIOS
    mov al, ah
    ; fore status in AX
    pop di
    pop si
    pop bp
    ; back to caller
_putxm endp
TEXT ends
end

```

(Figure 5 ends)

```

; SHOWMEM.C demonstrates use of the GETXM routine
; in EXTEND.ASM. Prompts for a physical (linear)
; memory address, then displays 64 bytes of memory
; beginning at that address in hex and ASCII.

; Compile: HARM /H /L EXTEND
; CL /L SHOWMEM.C EXTEND

; Usage: SHOWMEM (press <Enter>, "break" or "C" to exit)

; Copyright (C) 1989 Riff Davis Communications Co.
; PC Magazine v Ray Duncan v June 13, 1989

; Include <stdio.h>
; Include <conio.h>
; Define SUPSIZE 64

; extern GETXM(unsigned long, char far *, unsigned);
; extern PUTXM(char far *, unsigned long, unsigned);

main()
{
    char buffer[SUPSIZE];
    char input[80];
    char *p;
    unsigned long memaddr;
    int i;

    while(1)
    {
        printf("\nEnter extended memory address (hex): ");
        gets(input);
        if(input[0] == 0) break;
        memaddr = strtoul(input, &p, 16);
        if(memaddr > 0xfffff) /* check if address too large */
        {
            printf("Invalid extended memory address!");
            continue;
        }
        memaddr = 0xfffff; /* round down to paragraph boundary */
        if(GETXM(memaddr, buffer, SUPSIZE))
        {
            printf("Extended memory read error!");
            continue;
        }
        printf("\n\t 0 1 2 3 4 5 6 7 8 9 A B C D E F");
        for(i = 0; i < SUPSIZE; i += 16) dump16(buffer+i, memaddr+i);
    }

    /* Display 16 bytes from local buffer at specified starting address */
    dump16(char *buffer, unsigned long memaddr)
    {
        int i;
        printf("\n00000000\t", memaddr); /* extended memory address */
        for(i = 0; i < 16; i++) /* display hex for each byte */
            printf(" %02X", (unsigned char) buffer[i]);

        printf("\n");
        for(i = 0; i < 16; i++) /* display ASCII for each byte */
        {
            if(buffer[i] < 32 || buffer[i] > 126) putchar('.');
            else putchar(buffer[i]);
        }
    }
}

```

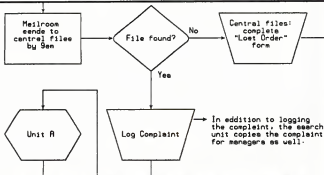
Figure 6: SHOWMEM.C is a simple program that illustrates how you can use the GETXM routine in your own applications for access to extended memory. To terminate SHOWMEM, press Enter alone in response to its prompt, or hit Ctrl-C or Ctrl-Break.

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plays the 64 bytes of memory starting at that address. You can reassure yourself that the program really functions as advertised by feeding it linear addresses that fall within the memory occupied by your program or by displaying the VDISK structure at 100000h that I discussed in the last issue. To terminate the SHOWXMEM

■ When using GETXMM and PUTXMM, remember that the ROM BIOS does not arbitrate between your program and other programs that are also using extended memory.

program, you can press the Enter key alone in response to the program's prompt or hit the Ctrl-C or Ctrl-Break key combinations at any time.

To build SHOWXMEM.EXE, simply enter:

```
MASH /Mx EXTMM;
CL SHOWXMEM.C EXTMM
```

When using the GETXMM and PUTXMM routines in your own applications, remember that the ROM BIOS does not make any attempt to arbitrate between your program and other programs that might also be using extended memory. Your program is always responsible for "allocating" and "releasing" its extended memory by using either the VDISK or the interrupt 15h methods I outlined in the last issue. In the next column, however, I'll show you how to manage extended memory in a "well-behaved" manner with Microsoft's HIMEM.SYS driver.

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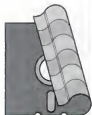
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SPREADSHEET CLINIC



An in-depth look at altering the colors of structures in a 1-2-3 worksheet; calculating the standard deviation of a population sample with the @STD and @VAR functions.

Understanding the @STD and @VAR functions

Both *Lotus 1-2-3* and *Quattro* offer @STD and @VAR functions. I had assumed that these functions calculate the standard deviation and variance, respectively, for a population, given a sample of the values in that population. Actually, the @STD function returns what is known as the population standard deviation, and the @VAR function returns the population variance. The equations that @STD and @VAR use are appropriate for a set of values that represent the entire population—not for a set of values representative of only a sample of a larger population.

For example, suppose that you test only 5 patients out of a total of 50. These 5 patients receive scores of 2, 5, 6, 7, and 10. Entering these results into cells A1..A5 of a worksheet and computing the standard deviation using the function @STD(A1..A5), you would get the incorrect result of 2.61. The actual standard deviation is 2.92. Similarly, the function @VAR(A1..A5) would return the value 6.8, when the true variance is 8.5.

You can adjust these functions to operate on a subset of values of a population and return the correct results. Simply multiply the @STD function by the factor

$$\text{@SQRT}(\text{@COUNT}(\text{range})/(\text{@COUNT}(\text{range})-1))$$

To adjust @VAR, multiply it by

$$\text{@COUNT}(\text{range})/(\text{@COUNT}(\text{range})-1)$$

In both cases, *range* is the address of the

cells that contain the values for which you want to calculate the standard deviation or variance. For example,

$$\text{@STD}(A1..A5)*\text{@SQRT}(\text{@COUNT}(A1..A5)/(\text{@COUNT}(A1..A5)-1))$$

will calculate the standard deviation of the values in cells A1..A5, and

$$\text{@VAR}(A1..A5)*\text{@COUNT}(A1..A5)/(\text{@COUNT}(A1..A5)-1)$$

will find the standard variance.—Allan Lauderback; Temple City, California

The @STD and @VAR functions do calculate the population standard deviation and variance. Therefore, they are appropriate only when your data represents the entirety of the population. If your data is only a sample of the total population, you should adjust these functions as described above. (*1-2-3's* manual explains this; *Quattro's* does not.)

■ The @STD and @VAR functions

calculate the population standard deviation and variance in *Lotus 1-2-3* and *Quattro* worksheets.

Unlike *1-2-3* and *Quattro*, *Excel* has functions for both: STDEV() and VAR() calculate the standard deviation and variance; STDEVPO() and VARPO() calculate the population standard deviation and population variance. Consequently, when you import a *1-2-3* worksheet, *Excel* replaces @STD functions with STDEVPO(), and @VAR functions with VARPO(). If you are building an *Excel* worksheet from scratch and wish it to be consistent with *1-2-3*, be sure to use the correct corresponding functions.

Of course, in any case, the greater the number of values in the population, the smaller the difference between the population and standard deviation and variance.

Changing the colors of structures in a 1-2-3 worksheet

I use both *Quattro* and *1-2-3* extensively. *Quattro* features commands that let you alter the colors of the various structures in its worksheets. A coworker tells me that the same is true for *Excel*. Is there a way to do this in *1-2-3*?—Michael O'Neill; New York, New York

The *1-2-3* program doesn't provide commands to change the colors of the structures, but they can be changed—and relatively easily.

The .SET files used to load Releases 2.0 and 2.01 and TD.DRV, one of the files used to load Release 1A, each have 5 bytes that control the foreground and background colors for different areas of the

■ SPREADSHEET CLINIC



The Five Bytes that Control the Colors of 1-2-3 Structures

A .SET File

Byte	Default hex value	Controls
1	07	Unhighlighted, protected cells Unhighlighted text in the control panel Text in help screens
2	30	Highlighted, protected cells Borders of worksheet The mode indicator (except WAIT and ERROR) Indicators that appear at the bottom of the screen (like Calc and Caps) Highlighted choices on standard and custom menus
3	0A	Unhighlighted, unprotected cells
4	3F	Highlighted, unprotected cells
10	C0	The special mode indicators WAIT and ERROR

A TD.DRV File

Byte	Default hex value	Controls
1	07	Unhighlighted, protected cells Unhighlighted text in the control panel Text in help screens
2	30	Highlighted, protected cells Borders of worksheet The mode indicator (except WAIT) Indicators that appear at the bottom of the screen (like Calc and Caps) Highlighted choices on standard and custom menus
3	0A	Unhighlighted, unprotected cells
4	2B	Highlighted, unprotected cells
10	C0	The special mode indicator WAIT

Figure 1: These tables show which bytes in .SET and TD.DRV files control the colors of the various structures in 1-2-3, Releases 2.0, 2.01, and 1A, respectively.

screen. And, in each case, they are the first, second, third, fourth, and tenth bytes within a sequence. Each byte controls the colors of one or more structures in a 1-2-3 worksheet, as detailed in Figure 1. Bytes 5 through 9 do not seem to affect the colors of any of the structures in a 1-2-3 worksheet.

The hexadecimal representation of each color-controlling byte consists of two char-

acters. The first determines the background color of the structure(s) controlled by that byte, as well as whether or not the foreground color will blink.

There are only eight background colors available (0 through 7), as shown in Figure 2. However, if you select a color using 8, 9, A, B, C, D, E, or F as the first character, 1-2-3 will still use one of the first eight colors for the background but will blink the

foreground on and off. For example, a first character of 9 specifies a blue (not light blue) background with a blinking foreground.

The second character in the hex representation of each byte controls the foreground color. Sixteen different foreground colors are available; they are also listed in Figure 2. For example, a second character of 3 specifies a cyan foreground; a second character of C specifies a light red foreground; and so forth.

CHANGING .SET FILES The best way to alter the color-controlling bytes is to use DEBUG. Just remember: before you begin to make changes to a file, always make a copy. This way, if you make a mistake, all is not lost. For our purposes, we'll assume you've named your copy of the original file COLOR.SET.

First, make current your directory that

■ The best way to alter the color-controlling bytes is to use DEBUG. Just remember: before you begin to change a file, always make a copy.

contains DEBUG and enter the command
debug path\color.set

where *path* indicates the directory or sub-directory that contains COLOR.SET. (If a "File not found" message appears, type q and press Enter to quit from DEBUG, then try again.)

Next use DEBUG's scs command to locate the header preceding the color-controlling bytes. Unfortunately, the header for systems equipped with CGA cards is different from the header in systems with EGA cards. If you have a header for CGA cards, the color-controlling bytes will start with the byte following the only occurrence of the hex characters E9, C8, and 05 within your .SET file. If this is the case,



Customizing Your Worksheet Display

Background Colors and Foreground Options

Background color	Regular foreground	Blinking foreground
Black	0	8
Blue	1	9
Green	2	A (or a)
Cyan	3	B (or b)
Red	4	C (or c)
Magenta	5	D (or d)
Brown	6	E (or e)
White	7	F (or f)

Foreground Colors

Code	Foreground color
0	Black
1	Blue
2	Green
3	Cyan
4	Red
5	Magenta
6	Brown
7	White
8	Gray
9	Light blue
A (or a)	Light green
B (or b)	Light cyan
C (or c)	Light red
D (or d)	Light magenta
E (or e)	Yellow
F (or f)	Bright white

Figure 2: You can change the colors of a 1-2-3 structure by modifying the hex representation of the color-controlling bytes. Select a background color from the first table shown above and substitute the corresponding number or letter for the first character of the hex representation. If you choose an item in the second column, 1-2-3 will use the same background as the first column, but will blink the foreground on and off. Then choose a foreground color from the second table and substitute the correct number or letter for the second character.

you should enter the command

```
scs:0000 ffff E9 C8 05
```

DEBUG will locate the first (in this case, only) occurrence of that sequence of bytes within the file and display the address of the first byte in the sequence (1254:3725, for example).

If you have an EGA card, the color-controlling bytes will follow the second occurrence of the hex characters F8, 81, F1, 89, and F9. To locate the header in this case, you would enter

```
scs:0000 ffff F8 81 F1 89 F9
```

(Note: From here on, the commands you

■ With an EGA card, the color-controlling bytes follow the second occurrence of the hex characters F8, 81, F1, 89, and F9.

enter are the same for CGA and EGA systems.)

When DEBUG returns the address of the first byte in the sequence, enter a command in the form

```
h address 3
```

where *address* is the final four characters in DEBUG's response to the scs command. For example, using 1254:3725 (the address of the first byte in the CGA sequence above), you would enter

```
h address 9
```

DEBUG will return two addresses (3728 and 3722 in this example). The first is the first color-controlling byte—the first byte following the last byte in the header.

To determine the address of the last color-controlling byte, enter

```
h 3725 3
```

where *address* is the address of the first color-controlling byte—or, continuing the example, 3728. DEBUG will return two more addresses: 3731 and 371F. The first

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Figure 3: You can change the colors of various structures in a 1-2-3 worksheet by using DEBUG to edit the color-controlling bytes. The two screen shots at left demonstrate the differences in a screen (Release 2.01) before and after the bytes were edited.

one, 3731, is the address of the last color-controlling byte.

Now enter a command in the form

d first last

where *first* and *last* are the addresses of color-controlling bytes 1 and 10, respectively. DEBUG will display the hex values of the ten bytes in a .SET file—originally 07, 30, 0A, 3F, 01, 10, 0D, 50, 85, and C0. To edit any of these bytes, enter a command in the form

a address one two three four five six seven eight nine ten

where *address* is the address of the first color-controlling byte, and one through ten are the hex values you've chosen to replace the original values. Remember, only five out of the ten bytes affect the color, so there's no need for you to change bytes 5 through 9.

Finally, you would enter w to write the changes to the file and enter q to quit the DEBUG program.

RELEASE 1A COLOR CHANGES As we mentioned earlier, the color-controlling bytes in Release 1A of 1-2-3 are located in the TD.DRV file. Figure 1 details which bytes in the TD.DRV file control the colors of the various parts of the screen, and it contains a listing of their individual default hex values.

If you compare this chart with the one for a .SET file, you will see some similarities: the first four bytes in the TD.DRV file control the appearance of the same structures as the first four bytes of a .SET file; with the exception of the fourth byte, the default value of each of the color-controlling bytes is the same as its equivalent in a .SET file; and, like the tenth byte in a .SET file, the tenth byte in the TD.DRV

file controls the appearance of the special indicator WAIT. But the tenth byte does not control the appearance of the ERROR indicator.

You can edit these bytes with the DEBUG program as well, by applying the commands and instructions given above. The only variation is, as it was above, in locating the header. These bytes follow the only occurrence of the sequence of hex characters 30 and 14 within the file. So the scs command will be

scs:0000 ffff 30 14

DEBUG will locate the occurrence of that same two-byte header within the file and will return the address of the first byte in that header.

Once you have modified the color-controlling bytes within a .SET or TD.DRV file, you will have to reload 1-2-3 using this file. The structures that are controlled by the bytes you have just changed will appear in the particular colors you specified. Figure 3 shows a 1-2-3 worksheet both before and after the color-controlling bytes have been edited.

Productivity Tip

The Worksheet Utilities is a collection of software tools that adds a variety of useful features to the Lotus 1-2-3 program. For example, *The Worksheet Utilities* gives you a multiple-line Edit line, the ability to create and save print settings sheets, and search-and-replace powers. *The Worksheet Utilities* is available directly from Funk Software (the company that brought you *Sideways*) for \$99.95. To order, call (800) 822-3865.

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Turning ATTRIB into a file finder with a new DOS 3.3 feature; ensuring proper installation of program disks; copying the contents of a whole floppy disk to one hard disk file.

How to use DEBUG to copy a whole floppy to a single hard disk file

Here's an easy way to store or communicate exact copies of DOS diskettes; it requires only a short DEBUG script.

DISKFILE.DBG, shown in Figure 1, will convert a standard 360K DOS diskette into a file named DISKFILE with a length of 368,640 bytes. The first five lines each load 64K of data from the disk into memory. The next line, L 7000, loads the remaining 40K of disk data. Then the script creates DISKFILE. Registers BX and CX hold the file size: by putting 5 in BX and A000 in CX, the script sets the file size to 5A000h (368,640) bytes. The last two lines write the file to disk and Quit. The diskette to be converted must be in the A: drive and must have a 40-track, 9-sector-per-track format.

FILEDISK.DBG, also shown in Figure 1, converts the file DISKFILE back into a 360K DOS diskette. The first line of FILEDISK.DBG identifies the filename to be loaded, and the next loads the file at address 2000:0. Lines three through seven each write 64K of data to the diskette in drive A:, and the second-to-last line writes the remaining 40K. The diskette to be written to must be formatted to 40 tracks, 9 sectors per track, and be in the A: drive.

To use these short script files, redirect them into the DEBUG.COM program:

```
DEBUG < DISKFILE.DBG
```

Because DISKFILE.DBG includes the boot record, FAT, directory layout, and

the subdirectory hierarchy in DISKFILE, you can even store and retrieve disks with hidden files or unique layouts without having to locate or deal with them. You could also easily modify these scripts to accommodate other diskette formats.

(a)

```
L 2000:0 0 000 80
L 3000:0 0 080 80
L 4000:0 0 100 80
L 5000:0 0 180 80
L 6000:0 0 200 80
L 7000:0 0 280 50
N DISKFILE
RBX
5
R CX
A000
W 2000:0
Q
```

(b)

```
N DISKFILE
L 2000:0
W 2000:0 0 000 80
W 3000:0 0 080 80
W 4000:0 0 100 80
W 5000:0 0 180 80
W 6000:0 0 200 80
W 7000:0 0 280 50
Q
```

Figure 1: DISKFILE.DBG (a) and FILEDISK.DBG (b) allow complete diskettes to be archived and transmitted, then retrieved and converted into their original format. Before you use FILEDISK.DBG with DEBUG, read the cautions in the article!

Distributing program disks electronically is one good way to use this technique. Entire diskettes may be easily converted to disk files that can be restored as exact duplicates of the original.—*Sigurd P. Crossland; Centreville, Virginia*

This technique is very useful, but you must take care when using it. Both scripts use the RAM at addresses 2000:0 to 7000:A000, disregarding the possibility that you might have programs loaded there. If that RAM is not actually available, your computer will lock up.

To verify that you can safely use these scripts, first run CHKDSK and see how many bytes of free memory it reports. You will need 360K (368,640 bytes) to hold the disk data, plus 15K or so to hold DEBUG.COM. If you don't have that much free RAM, try removing any RAM-resident programs or rebooting without them.

Assuming you have enough RAM, now check to see if the area of RAM the scripts use is free. Bring up DEBUG.COM and give the command RCS. This will report the value of the Code Segment in relation to which DEBUG will load programs. If it's less than 2000, you can safely run these scripts. If not, again try removing RAM-resident programs. Enter Q to Quit DEBUG.

The DEBUG scripts shown here must be run from a drive that has at least 368,640 bytes free. It's not possible to use a 360K disk to hold the resulting file, because the DISKFILE is bigger than the data area of a 360K floppy. As shown, the scripts create the DISKFILE in the current

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directory, whatever it may be. You can, of course, edit them to put the DISKFILE wherever you please, or use another name.

The author mentions modifying the script to accommodate other disk formats. Note that you won't be able to convert higher-density diskettes to a single disk file. The scripts depend on being able to load the entire contents of the diskette into RAM, and that's not possible with, for example, a 720K diskette. To modify the script for higher-density diskettes, create more than one disk file.

If you use these scripts to convert, compress, and transmit whole diskettes, save yourself some transmission time with a little preparation. Start with a freshly formatted diskette and copy the files onto it. Now use DISKFILE.DBG to convert it and a compression program to reduce its size. Because you started with a newly formatted disk, all of the unused bytes will have the same value. That should help your compression program reduce the DISKFILE to the smallest possible size.

An interesting but hazardous technique squeezes tiny programs into memory

When is a TSR program not a TSR? When it occupies memory that is not otherwise being used. Let me explain.

A friend wrote a TSR to issue a form-feed after Shift-PrtSc was pressed. His TSR intercepted interrupt 5 (the PrtSc interrupt), called the address that had formerly been at interrupt 5, and then used in-

terrupt 17h to send 0Ch (form-feed) to the printer. That's all, and it's about as simple as a TSR can get.

I've been investigating the interrupt table and other locations in low memory. On my machine, only interrupts 0-77h are used. Interrupts above this are used by the BASIC interpreter, which I never use. Therefore, there is a hole in the interrupt table starting at location 0:01E0, where interrupt 78h would be stored. The hole on my machine is large enough to contain quite a bit of code, so I rewrote my friend's TSR to sit here.

The result was a TSR that's not a TSR. Usually a TSR sits above the operating system but below any application program. My "TSR" sits below the operating system in locations that, at present, are unused. Such a TSR will not be in the normal chain of TSRs and hence won't be a part of any procedures to remove or disable TSRs, such as the various mark-and-release programs that are available.

You can ascertain whether or not you have a hole in your interrupt table by using DEBUG followed by several dumps starting at 0:0. If you do, you can execute the DEBUG script INT5.SCR (Figure 2) by typing

DEBUG < INT5.SCR

When you create the script file, remember *not* to type the comments (comments begin with a semicolon).—David Chinn; Issaquah, Washington

This utility is *not* for the faint of heart, but it's so unusual that I had to present it. Mr.

```
E 0:0014 E0 01 00 00
A 0:01E0
CLI ;disable interrupts
PUSH AX ;save all the registers used
PUSH DX
PUSHF
CALL $000:FF54 ;the POPF is done by the IRET of INT 5
XOR DX, DX
MOV AX, 000C ;AH gets 0C, formfeed
INT 17 ;service 0, with DX = 0
POP DX
POP AX
STI ;enable interrupts again
IRET

Q
```

Figure 2: INT5.SCR may appear to be a simple program that sends a form-feed to the printer. But because it resides in the interrupt vector table, you should heed the cautions before using it.

Chinn isn't quite right when he says his non-TSR uses memory that BASIC wants—interrupts 80h through F0h are the ones reserved for BASIC. However, he does overwrite interrupts in the range 68h to 7Fh, which are simply "reserved."

Before you consider running the script in Figure 2, you need to be sure its assumptions are correct. First, check to be sure the interrupt 5 vector points where the script thinks it does. Run DEBUG and give it the command

```
D 0:14 L 4
```

You should see this:

```
0000:0010          54 FF 00 F0 T...
```

If your display is different, don't use the script. Next, check to be sure the interrupt vectors the script overwrites are actually zero. Give DEBUG the command

```
D 0:1E0 L 14
```

```
E 0:14 54 FF 00 F0
F 0:1E0 L 14 00
-Q
```

Figure 3: UNINT5.SCR will uninstall INT5.SCR, shown in Figure 2.

The middle area of the display should consist of nothing but pairs of zeros, 16 pairs on the first line, four on the second line. If the display doesn't match this description, don't use INT5.SCR. Now enter Q to Quit DEBUG.

Suppose your system passed the examination above and you've loaded INT5.SCR. Try pressing Shift-PrtSc—indeed, you now get a form-feed after each use. Now what happens if you want to remove this non-TSR? Ordinary TSR managers won't handle it. Figure 3, UNINT5.SCR, is a DEBUG script that will restore the interrupt vectors to what they were before you ran INT5.SCR. Natural-

ly, you should *not* use it unless you have already run INT5.SCR.

If you test this utility and find it handy on your system, just put the line

```
DEBUG < INT5.SCR
```

into your AUTOEXEC.BAT file. Put it after any PATH statement that DOS might need in order to find DEBUG.

A new DOS 3.3 feature turns ATTRIB into a file finder

I wanted a way to search every subdirectory for a file. And I wanted to do this using the filename, an extension, or wildcards. So I wrote LOOKFOR.BAT (Figure 4).

This may be a bit slower than some commercial or public-domain programs that do the same thing, but it will work on any computer that uses DOS 3.3. In order

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■ USER-TO-USER

to use, simply enter

LOOKFOR FILENAME.EXT

Typing LOOKFOR *.BAT, for example, will list all the .BAT files in all subdirectories on the drive that you are currently in.—*Daniel Lewis; Newman Lake, Washington*

The /S switch for the ATTRIB command is new with the introduction of DOS 3.3. It causes whatever ATTRIB command you give to operate on the current directory and all of its subdirectories. Without other parameters, ATTRIB simply operates on the current directory, listing all files and their attributes that match your specification. If

```
@ECHO OFF
IF /%1 ==/ GOTO EXIT
ATTRIB %1 /S
GOTO End
:EXIT
ECHO Must have Parameters
:End
```

Figure 4: Use LOOKFOR.BAT, plus a filename, an extension, or wildcards, to search your current directory and its subdirectories.

you try this batch file with previous DOS versions, it just won't work.

You can issue the ATTRIB command without even using the batch file. This way you have the option to redirect its output. For example, piping the output through the MORE filter makes it stop at the end of every screenful. You could do this by entering the command

```
ATTRIB *.* /S | MORE
```

Or, you might want to redirect the output to a file for a list of all the files on your disk. As a bonus you'll know whether or not any of them are read-only or have their archive bit set; just note the R or A preceding the filename.

Productivity Tip

You can use the XCOPY command (which was introduced in DOS 3.2) for copying files to multiple floppy disks. Here's how to do it: Make sure that all of the files to be copied have their archive bit

```
ECHO OFF
REM VOLTEST.BAT
IF "%2"==" " GOTO BadParams
FOR %v IN (A: B: C: a: b: c:) DO IF %1==%v GOTO OK
GOTO BadParams
:OK
VOL %1 | FIND "%2" > VOLFILE1.TXT
COPY VOLFILE1.TXT VOLFILE2.TXT > NUL
IF NOT EXIST VOLFILE2.TXT GOTO ERROR
ERASE VOLFILE1.TXT
ERASE VOLFILE2.TXT
ECHO The disk in drive %1 IS named "%2"
GOTO End
:ERROR
ECHO The disk in drive %1 IS NOT named "%2"
GOTO End
:BadParams
ECHO SYNTAX: "VOLTEST d: VOLUME LABEL"
ECHO Drive d: may be A:, B:, or C:
:End
```

Figure 5: VOLTEST.BAT checks if a given volume label matches the disk in a given drive.

set by using the following command:

```
ATTRIB +R*.*
```

Now type

```
XCOPY *.* A:/M
```

When the disk in drive A: fills up, XCOPY will stop automatically and display an "Insufficient disk space" message. At that time you should insert a new disk and give the command again. Repeat until all files are copied.

A batch file that ensures proper installation of program disks

I often prepare sets of program disks for distribution to various users. The first disk in a set contains a batch file that installs all the others on the user's hard disk. Since each disk in a set has a unique volume label, it seemed sensible to have the batch file test the labels to ensure that the disks were being installed in the correct order.

The batch file commands

```
VOL | FIND "MY VOLUME" > MYFILE1.TXT
COPY MYFILE1.TXT MYFILE2.TXT > NUL
IF NOT EXIST MYFILE2.TXT GOTO ERROR
ERASE MYFILE1.TXT
ERASE MYFILE2.TXT
...
```

search for the label MY VOLUME by piping the VOL command output through the

FIND filter. If the name is not found, the output file will have 0 bytes.

The IF EXIST command will always test true regardless of the size of the test file, but the COPY command will not copy a file with 0 bytes. Therefore, after copying the output of the FIND command to a second file, the IF EXIST test will determine whether the original file had 0 bytes.—*Robert B. Cody; Santiago, Chile*

I completed the partial batch file example and put it into a simple VOLTEST.BAT file shown in Figure 5. It doesn't do anything except report on whether the disk in a given drive does or does not have a certain label. But you could easily incorporate it into a batch file that would, for example, refuse to proceed until the correct disk was in the drive.

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■ EDITED BY CRAIG L. STARK

POWER USER



Creating Word files on one system and printing on another; avoiding confusion when using multiple windows; speeding up spell checking large files with WordPerfect's dictionary.

Simplifying multiple window creation in Microsoft Word 4.0

Microsoft Word, Version 4.0, lets you work with up to eight windows at once, allowing you to look at or edit different documents or different parts of the same document. Setting up the windows can be a chore, however, so I've devised a set of four macros that let you divide the screen quickly. Each macro divides the viewing area into either two or three windows, either vertically or horizontally.

For two windows across, use the following macro:

```
<Ctrl-ESC>wsv35<Enter>
```

For two windows down:

```
<Ctrl-ESC>wsh12<Enter>
```

For three windows across:

```
<Ctrl-ESC>wsv22<Enter><Ctrl-ESC>wsv22<Enter>
```

For three windows down:

```
<Ctrl-ESC>wsh6<Enter><Ctrl-ESC>wsh6<Enter>
```

Note that these macros can be used in combination. For instance, you can use the first macro to create two side-by-side windows, then use the last macro in each side-by-side window to divide the screen into six parts.

If you find that the windows are too small to be useful, you'll probably want to make use of the zoom window command, Ctrl-F1, to give the entire screen to the active window. Alternatively, if you have a Hercules, VGA, or EGA card, you can

squeeze more lines into each window by starting Word with the command

```
WORD /H
```

If you make use of the /h switch, you'll also want to change the horizontal split macros to reflect the additional number of lines on the screen. The numbers will vary, depending on the monitor card.—Gary Pollack; Eugene, Oregon

If you have a color monitor, you might like to take these macros one step further. One problem with using multiple windows—particularly if you zoom them to full screen—is that you can easily get confused about which window you are currently in. You can solve that problem simply by assigning a different color to each window. With a small change to each of these macros, the macro will change the window color as it creates the window.

For example, you could modify the first

macro to read as follows:

```
<Ctrl-ESC>wsv35<Enter><Ctrl-ESC>  
wcdowm>3<Enter>
```

The second part of this macro will automatically set the new window to color 3—a greenish blue on my monitor.

Alternatively, since you'll be using different window combinations at different times, you might prefer to select your window colors on the fly. To use this approach, first create a macro called Color:

```
<Ctrl-ESC>wcdowm><f1>spause<Enter>
```

This macro takes you to the window options screen, puts the list of available colors on-screen, and pauses until you make your selection. Simply use the Arrow keys to point to the color you want and hit Enter to change the color.

With the color macro created, you only have to nest the macro in each of your window-creating macros. For example, you can modify the first macro to read

```
<Ctrl-ESC>wsv35<Enter><Ctrl-ESC>icolor
```

Similarly, change the third macro to read

```
<Ctrl-ESC>wsv22<Enter><Ctrl-ESC>icolor  
<Ctrl-ESC>wsv22<Enter><Ctrl-ESC>icolor
```

The macros will now pause after creating each window while you pick your color.—M. David Stone

■ When working with multiple windows, assign each window a different color to avoid confusion about which window you are currently in.

Speed spell checking by putting WordPerfect's dictionary in a RAMdisk

When WordPerfect checks spellings in a large document that is largely free from

■ POWER USER

such errors (for example, in a revision of a manuscript that was previously checked), much time is consumed by the hard disk reading/write heads seeking back and forth looking for different words in the main dictionary file.

The process can be sped up dramatically by putting the dictionary on a RAMdisk, if you have enough extra memory to set one up. Assuming a RAMdisk designated E: and *WordPerfect* program files located in subdirectory \WP in drive C: (substitute as appropriate), you would enter one of the two lines shown below in your AUTOEXEC.BAT file:

```
COPY C:\WP\LEX.WP E:\
COPY C:\WP\WP(WP)EN.LEX E:\
```

The first line shown above is for Version 4.2 of *WordPerfect*, and the second is for Version 5.0. Be sure your RAMdisk is big enough to accommodate the main *WordPerfect* dictionary; 284K should be sufficient unless you have added a lot of words to it.

Note that both AUTOEXEC.BAT and CONFIG.SYS are ASCII text files. If you use *WordPerfect* to modify them, you must retrieve them as text files and save the revised versions in DOS text file format.

Reboot your system after this change, in order to set up the RAMdisk and copy the main *WordPerfect* dictionary to it. Then change the default location of the main dictionary, as shown in the appropriate part of Figure 1.

Now, every time you use *WordPerfect* you can spell-check large files without a flicker of the hard disk activity light. If you need more RAMdisk space for another program, you can always delete the dictionary

there, and copy it back later as required.

I had wondered whether moving the supplementary directory to the RAMdisk would speed things up even more. Fortunately, it turned out to be unnecessary. That relocation would have been a little more complicated: the supplementary dictionary may be modified during a spell-check and would have to be copied back to nonvolatile storage after each time *WordPerfect* is run or the changes would be lost.—Alan D. Legatt; White Plains, New York

If your document is not huge, *WordPerfect* keeps it entirely in memory. Even if it is huge, *WordPerfect* makes only occasional disk accesses to read in a new chunk. But when it checks spelling, it has to access the dictionary file for every word in the document, and that adds up to a lot of disk activity. If you do spell checking routinely, this tip will speed your work.—Neil J. Rubenking

Use a Print-to-File command to simplify creating files on one system and printing on another

Microsoft Word users who don't have a laser printer on their desk but have access to one on another system can use *Word's* Print File option to create a printable DOS file. Once printed to disk, you have only to take the file to the other system and enter

```
Type a:filename.ext > prn
```

The only complication is that before printing the file to disk, you must be sure to

enter the appropriate .PRD file in the Printer Options menu—HPLASER1 for the HP LaserJet, for example. The macro below saves the .PRD filename of your current printer in the variable Printer, replaces the file with HPLASER1 in the Printer Options menu, pauses for you to enter a filename to print to, prints the file, and then sets the program back to the original .PRD setting.

```
<Ctrl-Bac>=set printer=field-HPLASER1<Enter>
f=space<Enter>
<Ctrl-Bac>=pr<Enter><Enter><Esc>
```

All that remains then is to take the file to the other system and print it out.—Bryan S. Jick; Glendale, California

The same approach to printing files on another system's printer can be used with any program that can print to disk. One of the nicer aspects of this technique is that it

■ If you enter an existing filename to print to, *Word* asks if it is OK to overwrite the file.

doesn't require the other system to have any particular program on it—or, indeed, any program at all. As long as it can read your disk, it can print the file.

One thing to watch out for when using this *Word* macro is the possibility of duplicating filenames. If you enter a filename to print to and the file already exists on-disk, *Word* will ask if it is OK to overwrite the file. The macro has no way to deal with the question, however, and the file will not print. One fix is to change the second line in Mr. Jick's macro to read

```
f=space<Enter><pause>
```

This will stop to let you enter the filename, then stop again after you hit Enter. If the filename is a duplicate, you can answer Yes to tell *Word* to print the file, or answer No to abort printing. In either case, you will then have to hit Enter to continue the macro to the end and reset your .PRD file back to the original.

For *WordPerfect* 4.2: Start up *WordPerfect* in Setup mode by typing WP/S at the DOS prompt. Then enter the commands in the left column:

```
<I>          Set directories and drives for dictionaries and thesaurus
E:\LEX.WP<CR> Change directory for main dictionary
<CR>         Do not change directory for supplementary dictionary
<CR>         Do not change directory for thesaurus
<E>         End Setup and return to WordPerfect
```

For *WordPerfect* 5.0: Start up *WordPerfect* in the usual manner, then enter the commands in the left column:

```
<SHIFT-F1>   Enter Setup mode
<7>          Setup location of auxiliary files
<4>          Change location of main dictionary
E:\<CR>      Directory where it will be found
<CR><CR>     End Setup and return to WordPerfect
```

Figure 1: After modifying your AUTOEXEC.BAT file as explained in the text, enter the commands in the left-hand column above that are appropriate for your version of *WordPerfect*.

Incidentally, rather than using the DOS TYPE command, as shown at the outset, you can also print the file on the second system with the COPY command, using the format

```
copy a:filename.ext prn
```

or

```
copy a:filename.ext lpt1
```

You can print several files at once by using a batch file. After printing the files to disk, just create a plain ASCII file of the form

```
Copy a:file1.ext prn
Copy a:file2.ext prn
Copy a:file3.ext prn
```

With Word, you create a plain ASCII file by answering No to the formatted question on the Escape Transfer Save menu. The batch file should have a .BAT extension—PRINTEXT.BAT, for example. You can then run it from the DOS command line and print all the files by simply entering PRINTEXT. —M. David Stone

Productivity Tip

Word-counting programs are useful, but they are not necessary with most word processors. To get a quick word count, set your margins to give 65 characters per line, count the number of lines, and multiply by ten. If necessary, get the number of lines by multiplying the number of pages by the number of lines per page. For normal text, the total will rarely be off by as much as 100 words.

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CONNECTIVITY CLINIC



Solutions for easy and inexpensive modem sharing; prevent anomalies and save RAM by removing programs from memory; making PC-to-Sun workstation connections.

ASCII terminals can talk to a mainframe host over Tymnet

I recently toured the ADP installation of a large manufacturing company. They were running applications hosted on an IBM mainframe, but they were using cheap ASCII terminals to do it. One supervisor said they just hooked to the mainframe through Tymnet. Did he know what he was talking about? We have lots of ASCII terminals and PCs and need a good way to run some applications on an IBM mainframe using 3270 SNA communications.—Sally Robbins; Round Hill, Georgia

Connecting inexpensive ASCII terminals (or PCs posing as ASCII terminals) to SNA mainframe computer systems requires a process called *protocol conversion*. You can buy and install your own protocol converter at the mainframe site and connect it to modems using either leased or dial-up telephone lines, or you can pay a company like Tymnet to do the work for you.

A protocol converter is a standalone black box that converts between different wiring schemes, such as coaxial and RS-232C, and between different data alphabets, such as ASCII and EBCDIC. Most importantly, it can also convert the screen control and formatting information sent by the mainframe into commands appropriate for the terminal or PC terminal emulation you use.

Using Tymnet's services gives you flexibility because you can call in from any

Tymnet node or interconnecting carrier from almost anywhere in the world. Tymnet does the whole job for you and gives you the reliability of its network. Tymnet also gives you level and predictable pricing. If you do it yourself, the long-term life-cycle cost of the system will be less, but the up-front cost will be higher—and the initial effect of Murphy's Law will probably be greater, too.

For information on protocol converters, call Avatar Corp. ((508) 435-6872). Avatar knows how to link terminals, PCs, and Macintoshes to mainframes of various kinds. To learn more about Tymnet's services, call (408) 922-6737.

Link PCs to Sun workstations easily using TOPS or NFS

What do I need in order to send and receive files and Unix e-mail to and from a net-

work of Sun computers, back up my hard disk onto a Sun tape drive, and make a printer on a Sun network behave as if it were my own? I have thin Ethernet in the walls of my office. Obviously, I need an Ethernet card and some software. But are all cards the same? Do I need huge, fancy, resident software, or is there something I can just load when I need it?—Walter Harley (via CompuServe)

Sun Microsystems has two solutions for anyone needing to connect a PC to Sun workstations. (Please note that there is a big difference between the way Sun uses the term *workstation* and the way we use it to refer to PCs on a LAN.) If you are trying to connect to Sun 3 systems, then you can keep things simple and effective by installing TOPS on all machines. TOPS lets any node on the network make resources such as drives and printers available to any other node. The latest version of TOPS has drivers for 3Com EtherLink II cards, making Ethernet connections easy.

But if the Sun systems can't run TOPS, there is another solution. Sun has a communications architecture called Open Network Computing that is based on standard protocols. At the top layer of this architecture is a distributed file system called Network File System (NFS), which handles the tasks of making resources available to different nodes on the network. Other software layers have the job of moving the data across the network between dissimilar systems. There are versions of NFS available for over 120 different combinations of computers and operating systems—in-

■ Connecting ASCII terminals to SNA mainframe computer systems requires a process called *protocol conversion*.

■ CONNECTIVITY CLINIC

cluding PCs under DOS and all Sun workstations.

If you use TOPS, you won't need to add any other software. But if you use NFS, you will need TCP/IP services for the Sun and PC machines.

For more information call TOPS ((415) 769-9669) or Sun Microsystems ((415) 960-1300). For information on TCP/IP services, call Wollongong Group ((415) 962-7100) or CMC ((805) 968-4262).

Removing programs from memory prevents anomalies and saves RAM

I need your advice on what seems to be a memory-resident problem. Our Novell NetWare over Token-Ring LAN includes an IBM System 36. To turn each PC into a terminal for the System 36, we load the IBM Workstation Feature software. By hitting the hotkey, you can return to the PC

mode. The problem is that when this software is in memory and we operate in the PC mode, our PC keyboards often shift. On the Enhanced keyboard, the arrow keys turn into numbers, and other keys change, too.

IBM doesn't give you a way to remove the terminal emulation software from memory. What do you suggest?—*Deon Cranford; Hamlet, North Carolina*

I think a good TSR removal product is what you need. There are a couple on the market and in utility libraries. The one we use at PC LAN Labs is *Pop Drop*, marketed by Bloc Publishing. We use it to remove LAN software whose authors weren't kind enough to equip their programs with an Unload feature. One *Pop Drop* feature you'll find useful is the Inactivate command, which lets you shut down a TSR without dumping it out of memory. *Pop Drop* costs \$49.95, so it might be an

inexpensive fix to your problem. Contact Bloc Publishing ((305) 445-0903 or (800) 888-BLOC).

Modem-sharing options vary in complexity, cost, and capacity

I am interested in the new V.32 modem that works at 2,400 and 1,200 bits per second in addition to 9,600 bps. But it isn't cheap. How can I have three or four people share one modem easily and inexpensively?—*Tom Horton; Marietta, Georgia*

Both UDS ((205) 721-8000) and Racal-Vadic ((408) 432-8008) have released or will soon release modems combining V.32 and the V.22 bis protocols in a single box. These modems give you 300-, 1,200-, 2,400-, or 9,600-bps service over dial-up telephone lines. They are literally the last modems you will ever have to buy—at

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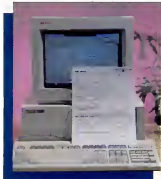
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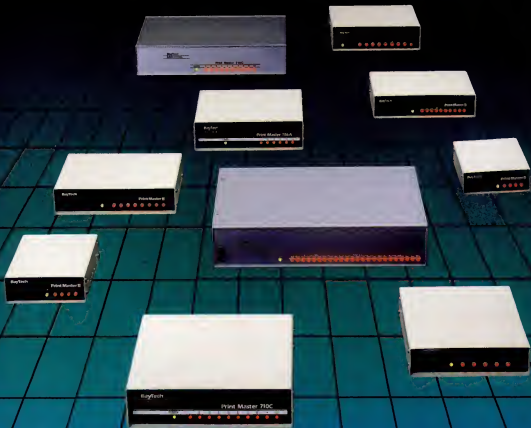
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■ CONNECTIVITY CLINIC

least until ISDN comes in. But with prices in the \$1,200 range, it can be too costly to put one on every desk.

There are three good modem-sharing solutions. The one with the lowest up-front cost is also the easiest to use: a four- or five-way RS-232C switch. Jade Computer's five-way RS-232C manual switch is \$68 and switches all wires—a must. You can call Jade Computer at (800) 421-5500.

You will need to run RS-232C cables of up to 100 feet from each station to the switch, which connects to the modem. Use cable wired straight through, not null-modem cable that has data lines swapped from one end to the other.

The next alternative is to use an automatic data switch, which offers such advantages as low cost, simplicity, and multiple-connection capability. Switch prices can be as low as \$100 per station, the cabling is easy to install, and you can share several modems among many people on a

first-come first-served basis.

Don't use the switches that are sold for printer sharing to share modems, because their buffers interfere with file transfers using Xmodem and other protocols. You need switches with full data-transfer capabilities. Excellent products are available from Newbridge ((703) 834-3600), Infotron LAN Systems ((800) 423-8044), Equinox Systems ((305) 255-3500), and other companies. A review of these products is scheduled for a future issue.

Your third alternative is to establish an asynchronous communications server on a LAN. As we showed in the May 16 issue of *PC Magazine*, these servers let hundreds of people share up to 16 modems.

Productivity Tip

If you have a server hard disk drive (DOS or Novell) that has been clobbered electri-

cally or mechanically, contact OnTrack Computer Systems, (800) 752-1333. We have seen them work wonders.

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Connectivity Clinic gives you practical solutions to networking problems of all types. We'll pay \$50 or more for any tips we print, *plus an extra \$5 if you submit your letter on a disk*. If you do, please include a printed copy. We'll gladly answer your questions at no charge, but we cannot answer letters personally. Mail contributions to Connectivity Clinic, *PC Magazine*, One Park Avenue, New York, NY 10016 or upload them to PC MagNet (to join, see the "By Modem" sidebar in the Utilities column). You may also contact Frank J. Derfler, Jr., via MCI Mail (use Derfler's box named CCNNECTIVITY CLINIC).

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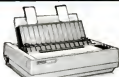
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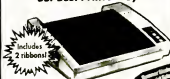
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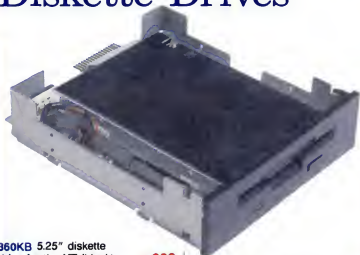
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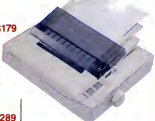
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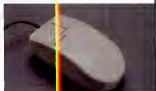
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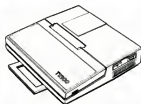
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u. ☐ In 4 to 6 months
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AFTER HOURS

GAMES

BattleHawks: 1942— Life and Death in the Skies of WWII

BY BILLO'BRIEN

BattleHawks: 1942 from LucasFilm Games is the most amazing combat simulation I have seen this side of a video arcade. LucasFilm has taken the World

torpedo planes.

Dump the stick forward and throw your Wildcat into a screaming dive. The Japanese Val dive bombers are flying in a V formation ahead and beneath you. Dig your thumb into the firing button and spray the left line of the formation.

Or see it from the opposite perspective. Three American SBD-3As approach you as you take your run against the Yorktown. They're better armored and armed than your Kate torpedo plane, but you're faster. One



Some *BattleHawks: 1942* scenarios evoke more action than even a two-gun Douglas can handle. Planes smoke, flame, and explode. Pilots sometimes bail out.

War II Pacific Theater and reduced its action to nibbles and bytes without resorting to the all-too-familiar—and boring—polygon frame shapes of most flight simulations.

But *BattleHawks* is not just flight, it's combat. Whether your character is Japanese and flying a thin-skinned Zero or American and wrapped in the iron cocoon of a Dauntless dive bomber, your wits and your skill keep your plane intact.

The simulations are excellent. You can choose among 16 possible battle scenarios from Midway to the Solomon Islands, either air-to-air or air-to-sea. For the Americans, six planes are available. The Japanese simulations can feature two models of the A6M2 Zero, two variations of the D3A1 Val bomber, or a duct of B5N1 Kate

of the SBDs climbs on your tail. You swivel the rear gun around and take aim, losing 150 rounds into the plane before it smokes and then explodes. No parachutes, no survivors. . . .

The manual, more than just an instruction guide, gives you a historical perspective of the era. And the game creates a feeling of true reality where some pilots have time to bail out of their planes and others are simply listed as killed in action.

List Price: *BattleHawks: 1942*, \$49.95. **Requires:** 384K RAM; CGA, EGA, VGA, or MCGA graphics; DOS 2.0 or later. Joystick or mouse recommended. Copy protected through documentation. LucasFilm Games, P.O. Box 10370, San Rafael, CA 94912; (415) 662-1902.

CIRCLE 636 ON READER SERVICE CARD

GAMES

Military Simulator: You Command The Great Armies of History

BY FREDERIC BURKE

Military history fans rival armchair quarterbacks for their second-guessing abilities. With 20/20 hindsight, war buffs are constantly gaming, correcting the "mistakes" made in battle. Whatever the battle, these games all have the same basic object: outwit and crush your opponent. Rainbird Software applied this philosophy to its \$49.95 *Universal Military Simulator*, a powerful and entertaining simulation.

UMS features five historically significant battles—Arbela, Hastings, Marston Moor, Waterloo, and Gettysburg—with the option of creating your own. You can also purchase additional scenario disks with re-creations of Vietnamese and Civil War battles.

After choosing which of *UMS*'s battles you would like to reenact, you assume the persona of commander-in-chief and go to work. Each military unit's vital statistics are displayed as you order it to attack, defend, or ma-

neuver into position.

UMS makes a great deal of information available to the user. It may seem a bit overwhelming at first, but as your skills grow, so will your appreciation of *UMS*. Control over cannon and arrow fire adds to the flavor of command, and the availability of "wildcard" units lets you tailor your forces as you wish.

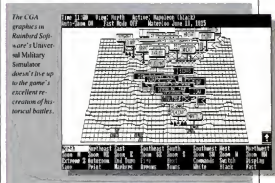
Clunky black-and-white CGA is all you'll find passing for graphics, and that really puts a damper on the package's appeal. While the main map, with its choice of viewing perspectives, is a handy reference for the location of units, names can be obscured.

The map also gets cluttered in the heat of battle. It gets progressively more frustrating to track who is going where. The lines tracing each unit's movements degenerate into a fuzzy black snarl.

UMS is a fun and informative package in search of better graphics. Armchair generals will find great satisfaction here, even if they do have to squint just a bit.

List Price: *Universal Military Simulator*, \$49.95. **Requires:** 512K RAM, CGA, DOS 2.0 or later. Copy protected through documentation. Rainbird Software, 3385 Bohannon Dr., Menlo Park, CA 94025; (415) 322-0412.

CIRCLE 637 ON READER SERVICE CARD



AFTER HOURS

GAMES

Broderbund's Star Wars Recalls the Arcade Game and Film

BY BILL O'BRIEN

Even now, years after *Star Wars*, the movie, was released, I can't resist the spectacle of Imperial fighters exploding in front of me as laser cannons rake their hulls. But it's expensive to pump an endless round of quarters into the Tengen arcade version that depicts the classic destruction of the Empire's evil Death Star.

Thanks to Broderbund Software I can now sit in the privacy of my office and blow the Empire out of existence—and Broderbund's version of *Star Wars* is almost an exact duplicate of the original arcade game. One of the few concessions is the option of using a mouse or the keyboard instead of the more traditional joystick.

You will not be overawed by the CGA or Hercules graphics. In keeping with the original game appearance, all objects are wireframe forms. But these comparatively rudimentary graphics won't stop you from decimating the Imperial fighters that try to block your way or keep you from traversing the

face of the Death Star while gingerly blowing up laser towers.

And once in the trench, you have only to wind your way through the maze of obstacles until you can safely drop your bomb into the exhaust vent. Of course, during all of this rampant destruction you are being bombarded by fireballs that sap your shields and—eventually—blast you from the sky.

There is a caveat that goes along with all of this fun. Broderbund suggests that *Star Wars* runs on IBM and Tandy or 100-percent-compatible equipment but doesn't mention which machines. Don't try it on a PC- or XT-class 4.77-MHz computer. Even at 8 MHz the action is barely bearable. You won't capture the full flavor of the game at under 16 MHz, and you won't start to sweat until you hit 20 MHz. At speeds higher than that, you will die.

Translating a video arcade game into PC software is no simple task. Few companies have done it successfully, but Broderbund joins these select ranks with its excellent version of *Star Wars*.

List Price: *Star Wars*, \$39.95.
Requires: 256K RAM, CGA or Hercules graphics, DOS 2.0 or later. Copy protected with key disk. Broderbund Software, 17 Paul Dr., San Rafael, CA 94903; (415) 492-3200.

CIRCLE 636 ON READER SERVICE CARD

Broderbund Software's PC version of *Star Wars* faithfully reproduces the action of the arcade, provided that you have a fast enough machine.



After 5 days adrift in a lifeboat, Larry realizes that he hasn't brought anything to cover his head.

GAMES

The Sleaze Returns: Leisure Suit Larry Comes Back for More

BY DONALD B. TRIVETTE

I found my passport in the trash. I escaped the evil clutches of two ravishingly beautiful women, and I even got away from the whips and chains of kinky "Big Mama." Yes, I survived all of that... only to end up as so much dust in the bottom of a lifeboat because I forgot to buy pre-Classic Coke in the Quickie Mart. Life can be tough when you're playing Sierra On-Line's newest 3-D adventure game, *Looking for Love (In Several Wrong Places)*.

Affectionately known as *Larry II*, this is the long-awaited sequel to Sierra's first adult adventure game, *Leisure Suit Larry in the Land of the Lounge Lizards*. Larry's second adventure seems to have fewer unexpected hazards than his first. He doesn't have to worry about falling over the side of the ship or stepping into a hole. Indeed, he can even walk in the streets with impunity. Nevertheless, *Looking for Love* isn't without peril—just follow the wiggly blonde or take the cocktail hostess up on her proposition.

Written with Sierra's new SCI adventure-game software, *Looking for Love* has high-resolution graphics and supports either joysticks or mice as optional input devices. *Looking for Love* also has an awesome musical score—in stereo—but only if you've shelled out (\$200 minimum) for one of the three supported music cards.

The language interpreter is better than ever. It seems to understand many of the vile things you might type when things don't go your way. It even responds appropriately with phrases like "You wouldn't like the taste of it" and, "I'll bet you'd like to."

Lest you be concerned about true X-rated language, however, *Looking for Love* has a user-controlled "filth" level. But there are few four-letter words even at maximum filth—heck, for example, becomes *hell*.

Will Larry—ever the nerd—overcome his adversities and find true love? Will he learn the secrets of Dr. Nonookie? You'll have an awful lot of fun finding out.

List Price: *Looking for Love (In Several Wrong Places)*, \$49.95.
Requires: 512K RAM; CGA, EGA, MCGA, or VGA graphics, DOS 2.0 or later. Not copy protected. Sierra On-Line Inc., P.O. Box 485, Coarsegold, CA 93614; (800) 344-7448.

CIRCLE 648 ON READER SERVICE CARD



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AFTER HOURS



GAMES

Hidden Agenda Puts You in Control of An Emerging South American Country

BY M. STEPHANIE RICKS

Hidden Agenda, a role-playing game by Springboard Software, is set in the mythical Central American nation of Chimerica. After years of outside colonial and military intervention, Chimerica is poised at the crossroads of democracy or continued military rule.

A corrupt dictator has been overthrown, and a coalition government has elected you its President-designate. Your task as President is to strengthen the economy, restore respect for the government, and ensure human rights. You must maintain authority, form coalitions, and set government priorities, all the while keeping an eye peeled for subversive elements. Your 3-year term in office is not guaranteed, and ouster is always imminent.

You can choose to assemble a cabinet from a bank of candidates who are drawn from three political parties: Christian Reform, Popular Stability, and National Liberation. They run

the gamut from liberation theorists to Marxists. Your policy decisions can be made automatically or after consulting the appropriate minister. You can even ask for the input of your entire cabinet.

Hidden Agenda is very simple to play. Most decisions are initiated in your "office," a desktop icon that displays menu selections. The arrow keys highlight your menu choices.

Much of *Hidden Agenda's* action occurs in the Encounters and Consultations menus. Decisions made here have a ripple effect on all future edicts that you put forth.

In the Consultations menu, you meet with your ministers to discuss specific proposals and set the tone for your administration. These proposals might relate to government spending, food subsidies, or foreign trade.

For example, Defense Minister Julio Olivares Las Casas, a member of the National Liberation party, might want to discuss death squads and the state of human rights. Minister Las Casas wants all members of the deposed dictator's guard jailed and tried for human rights abuses. You have several options: open the dialog to include input from other cabinet members, weigh the feasibility of retroactive justice against the benefits of acknowledging and then laying to rest a sad chapter in Chimerican history, or postpone a decision.

After accessing the Encounters menu, you can preview IMF representative Sourwine's credentials before conferring with her.



pone a decision.

The Encounters menu leads you to meetings with, among others, a human rights activist representing "Mothers of the Disappeared," your health commissioner, and ambassadors from the U.S. and the U.S.S.R.

For instance, in the Encounters menu, you could meet with Claudio Aguilar Herrera, an itinerant farm worker and spokesperson for the "Land Now" movement. Señor Herrera wants displaced farm workers awarded their own land. After accepting your Agricultural minister's advice not to grant title deeds to the farm laborers, you might be faced with rioting in the streets by unhappy farm workers. The crisis could escalate to the point where workers seize farmland and you are faced with the unpleasant task of sending out the military to disperse the crowd and arrest agitators.

Hidden Agenda is an evenly paced game, except for those situations that demand quick and decisive action. Urban residents may demonstrate against food prices, which have increased 300 percent since you took office, and the unavailability of basic goods. Landowners might protest the redistribution of farmland to peasants.

Hidden Agenda tracks your progress in the Reports menu, which is a depository for foreign

and local news clippings. The Reports menu also includes graphs that chart statistics like infant mortality, military expenses, and social spending.

Hidden Agenda is challenging and intelligent, and with its allusions to several present-day Latin American countries it offers an interesting change from the common shoot-'em-up interactive game. Springboard manages to include representatives to UNESCO, the Organization of American States, and the World Court, and even references to Miguel de Cervantes, among others.

In the words of John F. Kennedy, "At some future date the high court of history sits in judgment on each of us, recording whether in our brief span of service we fulfilled our responsibilities to the state..." To that end, *Hidden Agenda* provides a news synopsis printed 100 years after the end of your term in office. It details the accomplishments or failures of your administration. That is the time to decide whether or not you were successful in implementing your political agenda.

List Price: *Hidden Agenda*, \$59.95. **Requires:** 512K RAM, CGA or EGA, DOS 2.0 or later. Not copy protected. Springboard Software Inc., 7808 Creekside Circle, Minneapolis, MN 55435; (612) 944-3915.

CIRCLE 624 ON READER SERVICE CARD



In *Hidden Agenda's* Consultations menu, Fleming, your internal affairs minister, proposes additional funding for education.



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AFTER HOURS



GENEALOGY

Personal Ancestral File Helps Organize Facts of Family History

BY DONALD B. TRIVETTE

If I am to believe the research of others, my family's roots were planted in the soil of England by Fulbert the Saxon around the year 1100. It wasn't until August 1657 that my very-great grandfather Robert Hodgson opened an American branch of the family with his arrival in New York City (then New Amsterdam), and was promptly tossed in jail by Governor Peter Stuyvesant for failing to remove his hat.

With all this ancient family lore piling up on scraps of paper in my desk drawer, I thought it time to look for a modern, systematic way to keep track of my ancestors. Thus I began using *Personal Ancestral File*, a genealogy program written and distributed by the Family History Department of The Church of

Jesus Christ of Latter-Day Saints—the Mormons.

Personal Ancestral File is the answer to a non-computer user's prayers: its 400-page looseleaf manual anticipates and answers every question likely to be asked by a little old lady wearing a DAR pin.

In an age of pull-down this and pop-up that, *PAF* uses old-fashioned numerical menus—I to enter data, 2 to modify data, and so on—that are both primitive and refreshingly simple. In fact, this utilitarian philosophy is maintained throughout the program. The newest version of *PAF*, Version 2.1, does offer color as an option, but only to distinguish the screen format from what you type. If you want grandparents shown in one color and cousins in another, you'll have to look to different software.

For each family member, *PAF* allows you to enter a surname along with three given names and an attribute such as Jr. or III. You may then enter dates and up to four place names for events like birth, christening, death, and burial. At the bottom of the screen there's room for Mormons to record special dates and temple codes relating to their religion, but Version 2.1 lets you turn off those fields when installing the program. Both the data-entry and the modify-data screens have full-screen editing, so mistakes are easily corrected. Free-form notes can be tagged onto any individual's records.

PAF constantly peeks over your shoulder in an effort to prevent errors. When you type the

name of a person or a place, it's automatically checked against a dictionary of all other names you've entered, on the assumption that many of the names in your family records are the same. For example, if you type "Smith" instead of "Smith," *PAF* will beep and ask you to retype the name.

The program's greatest shortcoming is its inability to order children chronologically in a family. Children are shown in the order that you entered their names. Should you discover more-accurate birth dates for some of the offspring of your great-great-great grandfather (and it happens more often than you'd think), updating the indi-

vidual's date does not change his order in the family; to accomplish that, you must delete and reenter the individual. *PAF* programmers are working on the problem.

Once you have recorded your family tree, you'll want to sort and print it in different ways. *PAF* lets you print a pedigree chart, a family group, a descendants chart, and half a dozen others, including sorted lists. Version 2.1 adds support for laser printers.



Personal Ancestral File's pedigree feature displays family relationships in a graphical form; the numbers after individual names are ID numbers.

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Personal Ancestral File also

has features for professional genealogists. There's a separate program called *Genealogical Information Exchange*, which is used to filter family information and send it to other researchers. Another program, the *Research Data Filer*, is an electronic notebook that manages research notes until they're complete and accurate enough to be included in the family records.

The Mormons have religious beliefs that encourage the collection and recording of family information, so it's not surprising that *PAF* is one of the most popular genealogy programs around (see *After Hours*, *PC Magazine*, December 13, 1988, for some others), and at \$35, it

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